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Output Increased by the Systematic Scheduling of Shop Work

BY CRIS BERG*

¶ *Faced with the necessity of larger output and lower costs, a comparatively small manufacturer of contractors' equipment took under consideration a shop expansion program estimated at* $250,000.

¶ *But by investigating the possibility of more effective use of equipment on hand and of labor time, a* 50 *per cent increase in productive capacity was obtained at an expenditure of approximately* $30,000.

¶ *To the systematic routing and scheduling of work through the shop, described in detail by Mr. Berg, is attributed the marked increase in output with the minimum of additional investment.*

IT is frequently asserted that modern management and production methods used in large manufacturing plants cannot be adapted economically to shops which employ only a few hundred men. Argument is based on the increased overhead when as a matter of fact it is often possible that the increase in overhead need be only a fraction of the savings which accrue from a more efficient use of man and machine hours.

It is logical that the plant owner should first turn to means of making the best use of the capital which already has been expended, and to a greater flexibility of his working force. When these combinations have been improved to their practical limit then, if conditions warrant, he should turn to additional capital expenditure. It is obviously unfair to equipment builders to install time and labor saving devices under conditions in which they cannot perform, or even are not allowed to perform, work in the manner and in the quantity for which they were designed.

Frequently shop capacity is reduced because the foreman is swamped with a flood of details which prevent him from performing his duty as a true supervisor. Routing and scheduling work through the shop and giving detail work to clerks is often well worth its cost.

A striking example of the results brought about by planning is afforded by the present practice of a small shop in which contractors' equipment is manufactured. Production is for the most part of a standard line of equipment, but due to making of extra parts and of repair parts for obsolete models, a fair share of the shop capacity is engaged on what is not unlike jobbing work. This plant, which is valued at about $800,000, comprises a machine shop, structural shop, an electric steel foundry and an erection or assembly department. About 175 people are employed.

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The owner realized that costs were high and he was in urgent need of increased production. He first gave thought to expanding his shop and obtained an estimate of $250,000 for the work. A new foundry was to cost $150,000 and $100,000 was provided for new equipment to increase the productive capacity of the shop by 50 per cent. In the final analysis a more effective use of the equipment at hand and labor time resulted in the 50 per cent increase in productive capacity and not more than $30,000 was expended. Included in this figure was one item of $15,000 for a new electric furnace.

The capacity of the plant was increased so that it was necessary to take on new lines in order to keep operating at capacity. A 10-in. turret lathe and a three-spindle drill press only were installed to replace old equipment. Several machines were turned around to rearrange production groups, and a few machine drives were altered to obtain more suitable feeds and speeds, this often entailing not more than the change of a single pulley. No change was made from the use of hand trucks and wheelbarrows for transporting parts in the shop.

The old plan of scheduling work through the shop had grown up with the plant. As orders became more numerous it was necessary to get out more work, but the only effort put forth was that of brute force. Foremen were so entangled in a mass of details, such as hunting jobs for the men, hunting drawings, etc., that they had little time to properly supervise either the quality or quantity of output. They were almost entirely without records, depending upon memory, although it was not uncommon to have 30,000 pieces or more in the shop at one time.

By far the most important change made in the methods of this plant was brought about by systematic scheduling of orders and machines. This change permitted foremen to function in their proper capacity as supervisors and, by

providing checks on material in process and in the storehouse, eliminated much of the previous delay.

Shop Order Forms Prepared by Production Department

In the present practice of this plant all manufacturing orders originate in the manager's office. Standard bills of material and all drawings needed in the production of the various models of machines manufactured are furnished by the engineering department. Files of blueprints on standard machines are kept in each shop department, and it is the duty of the engineering department to keep these files complete and up-to-date. Blueprints for special jobs are attached to the manufacturing order by the engineering department, the order, prints and bill of material then being sent to the production department. The latter department does all the paper work, including preparation of the shop order sheets, route tags, time cards and other forms used in connection with the various regular and special production orders.

Shop orders, in the form of the combination shop order and route sheet shown in Fig. 1, are prepared in the production department from standard bills of material, stock requisitions and sales orders. Department numbers, symbols and other routing information is then added by the route clerk from the master route card shown in Fig. 2. There is also indicated, at the extreme right-hand side of the shop order sheet, in the "number of forms required" columns, the casting issue cards, route tags, transfer slips, time cards and other forms required for the particular part on order. The make-up of these cards and tags may be noted from Fig. 4.

The shop order sheet is then put through a duplicating machine and a number of copies, one of which is shown in Fig. 3, obtained. At the same time a complete set of the castings issue and other cards shown in Fig. 4 is hectographed from the original shop order sheet. The cards are then checked and clipped together, forming a package for each part or lot to be manufactured, so that as they are handled in the shop they will not accidentally become separated or disarranged. The card on top is always the one to be removed for the next shop operation. The writing of the one order form, Fig. 1, from which all other instructions are hectographed, eliminates the possibility of errors in copying.

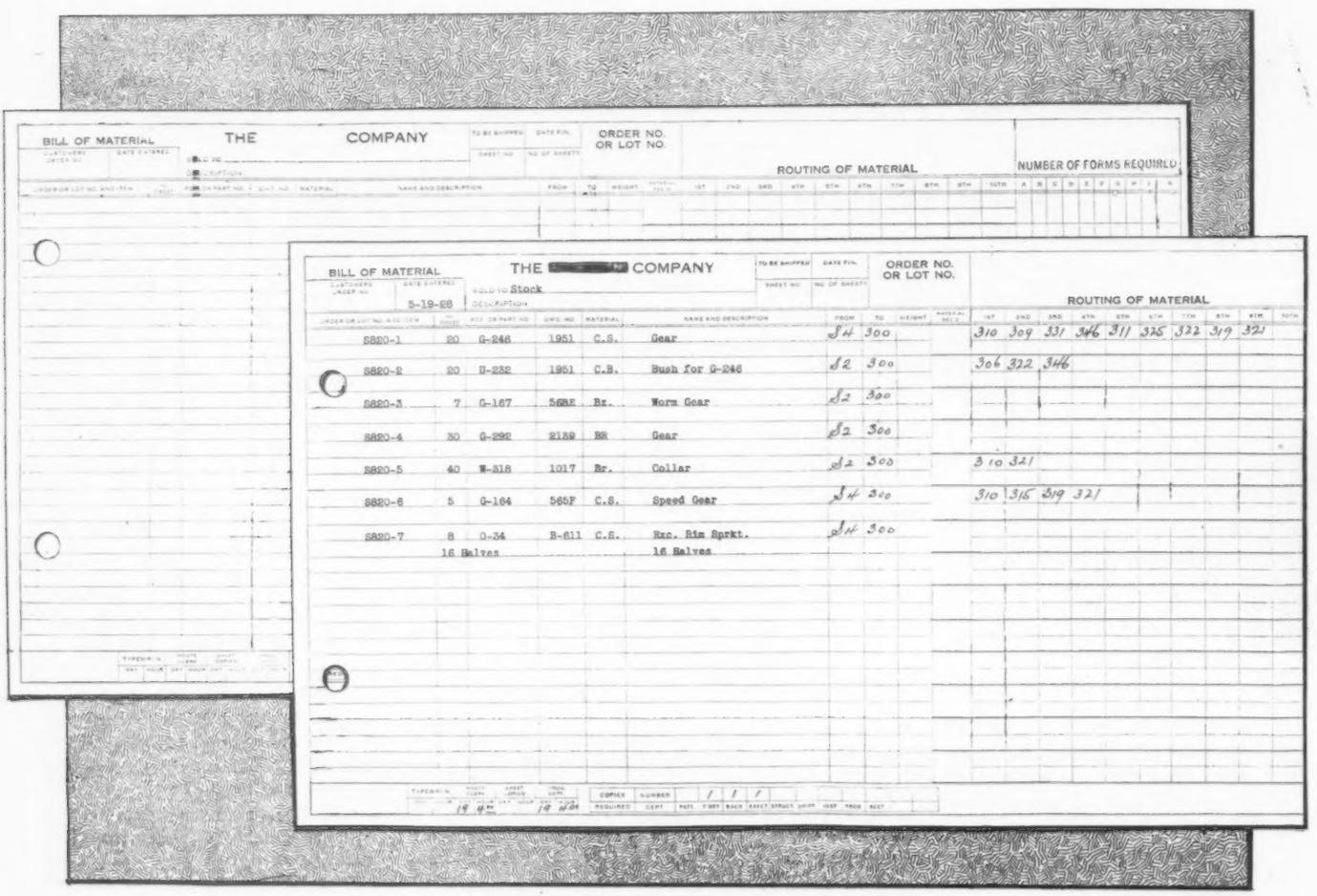

BILL OF MATERIAL
THE COMPANY
ORDER NO. OR LOT NO.
ROUTING OF MATERIAL
NUMBER OF FORMS REQUIRED
BILL OF MATERIAL
THE [redacted] COMPANY
ORDER NO. OR LOT NO.
ROUTING OF MATERIAL
5-19-28
Sold to Stock
S820-1 20 G-246 1951 C.S. Gear
S820-2 20 D-252 1951 C.B. Bush for G-246
S820-3 7 G-167 568E Bz. Worm Gear
S820-4 30 G-292 2139 BR Gear
S820-5 40 W-318 1017 Br. Collar
S820-6 5 G-164 565F C.S. Speed Gear
S820-7 8 O-34 B-611 C.S. Rxc. Rim Sprkt.
16 Halves
16 Halves

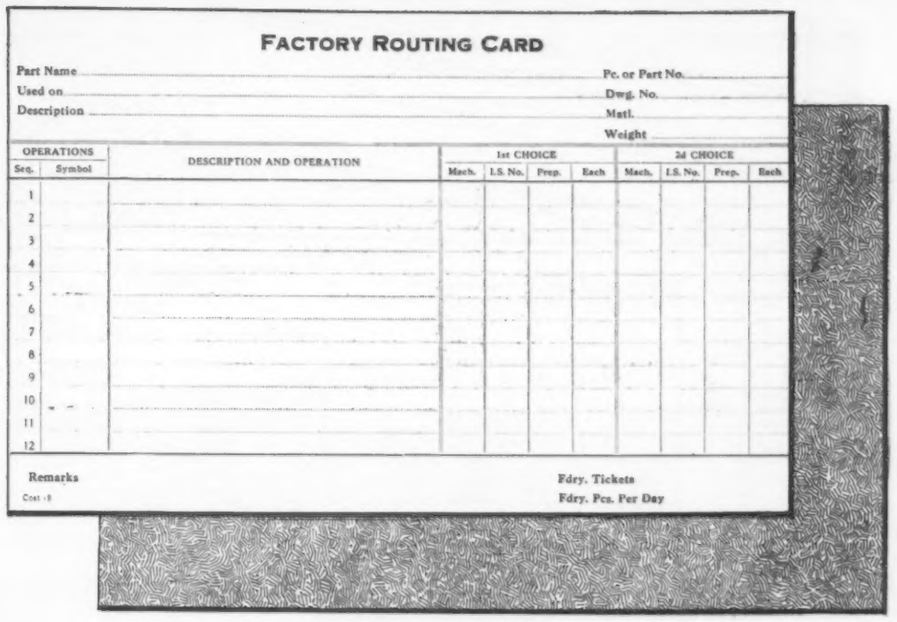
Fig. 1.—The Combination Shop Order and Route Sheet (the upper form) Is Prepared in the Production Order Department. It is printed and filled in with hectograph ink and becomes the standard form from which all other instruction cards and forms are impressed

Fig. 3.—Hectograph Copies of the Shop Order Are Made As Shown in the Insert. The hectographing eliminates the possibility of errors in retyping

Before leaving the production department, a copy of the shop order, with its package of cards, is sent to the rate setter, who writes the piece rates and other related information on the time cards. The shop order is then ready for scheduling.

Dispatch Racks Used in Shop Departments

Departmental control of order of work and other steps in the production processes is facilitated by a "material-not-in" file and a route board, or dispatch rack, in each shop department. When the shop is ready for additional work, the order sheet and package of cards are sent to the timekeeper of the department in which the parts covered by the order first go into production. Until work on the order is



FACTORY ROUTING CARD

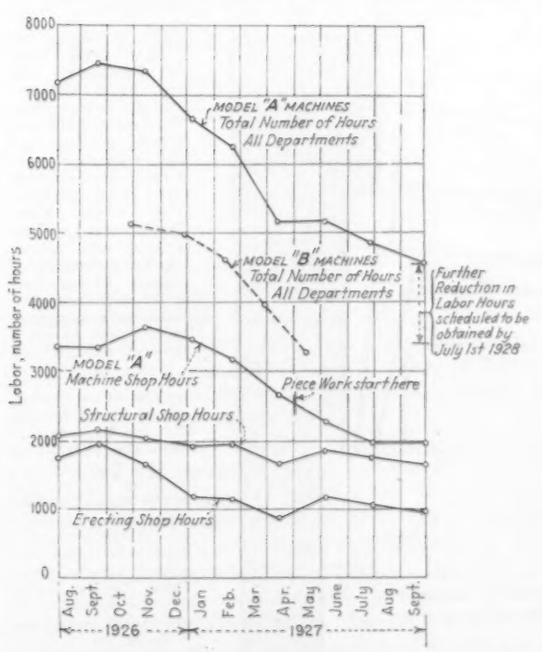
Part Name ..... Pc. or Part No. .....
Used on ..... Dwg. No. .....
Description ..... Matl. .....
Weight .....

OPERATIONS Seq.	Symbol	DESCRIPTION AND OPERATION	1st CHOICE Mach.	I.S. No.	Prep.	Each	2d CHOICE Mach.	I.S. No.	Prep.	Each
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

Remarks ..... Fdry. Tickets .....
Cost - 8 Fdry. Pcs. Per Day .....

Fig. 2.—Master Route Card Used by the Production Order Department in Making Up the Combination Shop Order and Route Sheet Shown in Fig. 1. The production order department does all the paper work, including preparation of the route tags, time cards and other forms used in connection with regular and special production orders

actually started, the order and cards are kept in the department's "material-not-in" file. When the work is to be started, the time, stores issue, transfer slips and route tags are removed from the package and sent to the stockroom for the material. The material is then delivered by the stockroom to the machine or bench at which the first operation is to be performed, the exact place of delivery being indicated on the route tag, which remains with the material or part in process until the part reaches its final destination in the plant. Transfer slips are made out in duplicate so that both the sender and receiver have a receipt for the movement of the material. These slips also serve as notification to the timekeeper of the department that the material is on hand ready for the first operation.



The Graph Indicates the Progress of Reduction in Labor Hours Which Followed Systematic Shop Scheduling. In May, 1927, piece-work rates were established on some machining operations

Upon arrival of the material in his department the timekeeper removes the package of cards from his "material-not-in" file and places it in the third or back pocket of the route board or dispatch rack, which has a section of three pockets for each machine or bench in the department. When ready to begin operations on a part on order, the foreman takes the package of cards from the third or back pocket assigned to the particular machine, bench or man performing the first operation and places it in the next, or middle, pocket of the same section of the route board. The packages of cards in the middle pocket are arranged in the order in which they are to be used, thus constituting an order-of-work file for a given machine, bench or man.

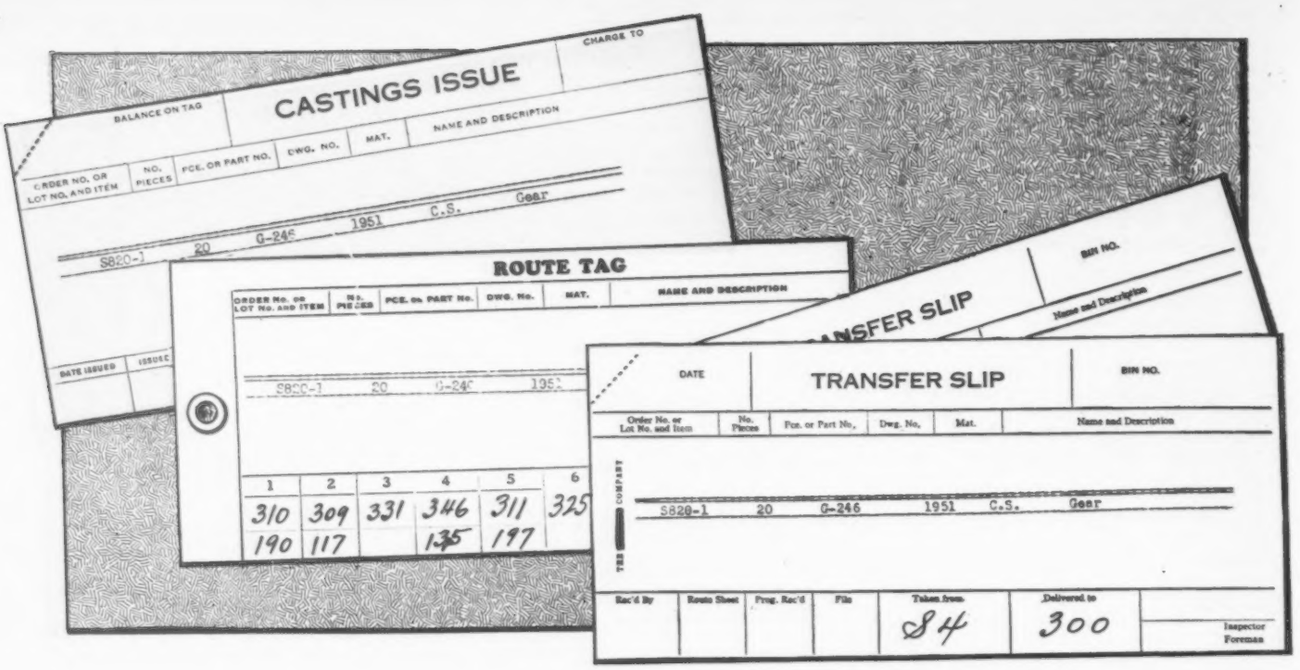
Blueprints Issued with Operation Time Cards

When work on a given order is to be started, the timekeeper takes the front package of cards from the second pocket of the route board, removes the first operation time card and stamps it for "start." The remainder of the package of cards is then put in the first pocket of the board, which shows that this machine is working on the job covered by the card. The first pocket, it should be noted, contains only the time cards and transfer slips for the part being worked on by the machine or bench to which the pocket is assigned.

With the time card, the blueprint of the part to be machined is issued, the blueprint being returned to the timekeeper at the completion of the job, at the time of stamping "out" the time on that particular operation. The timekeeper then takes the front package of cards from the second pocket of the same section of the route board, removes the top time card and stamps the starting time on it; in this manner each machine in the department is kept supplied with work.

The first operation having been completed, the timekeeper advances the package of cards to the third or rear pocket of the section of the route board assigned to the machine which is to do the second operation on the piece. Thus as each operation on a given part is completed the remainder of the cards on the production order are moved to another section of the route board, according to the sequence of operations.

For special orders that go through the shop in a single or job lot number, route tags similar in form to that shown in Fig. 4 are issued by the production order department. These tags are printed in eight colors. A white tag signi-



fies that the material going through the shop is to replenish stock. Dark red tags indicate that the parts to which they are attached are on a rush or a special order. Various other colors are used to designate the parts of certain models of standard machines.

Costs Compiled in Main Office

Timekeeping, in so far as shop costs are concerned, is done in the shop office. The main office cost department figures and compiles each day the cost of all completed jobs. On the following day a sheet showing total time and money for each operation performed on the various jobs, is prepared and sent to the foreman, who has at his desk a file of former costs on similar jobs. This affords him the opportunity of comparing present with past performances. At the same time the main office gets a copy of the report as to detail and total cost. Two days after a lot of machines has been completed the general manager has all the cost data before him.

Savings made by the adoption of systematic routing and scheduling, and by other changes noted above, are shown on the chart on page 3. In November, 1926, machine shop hours on the model "A" machine were 3640 and by September, 1927, they had dropped to 1950. In the same year structural shop hours had been cut from 2150 to 1625 and erecting shop hours had been reduced from 1950 to

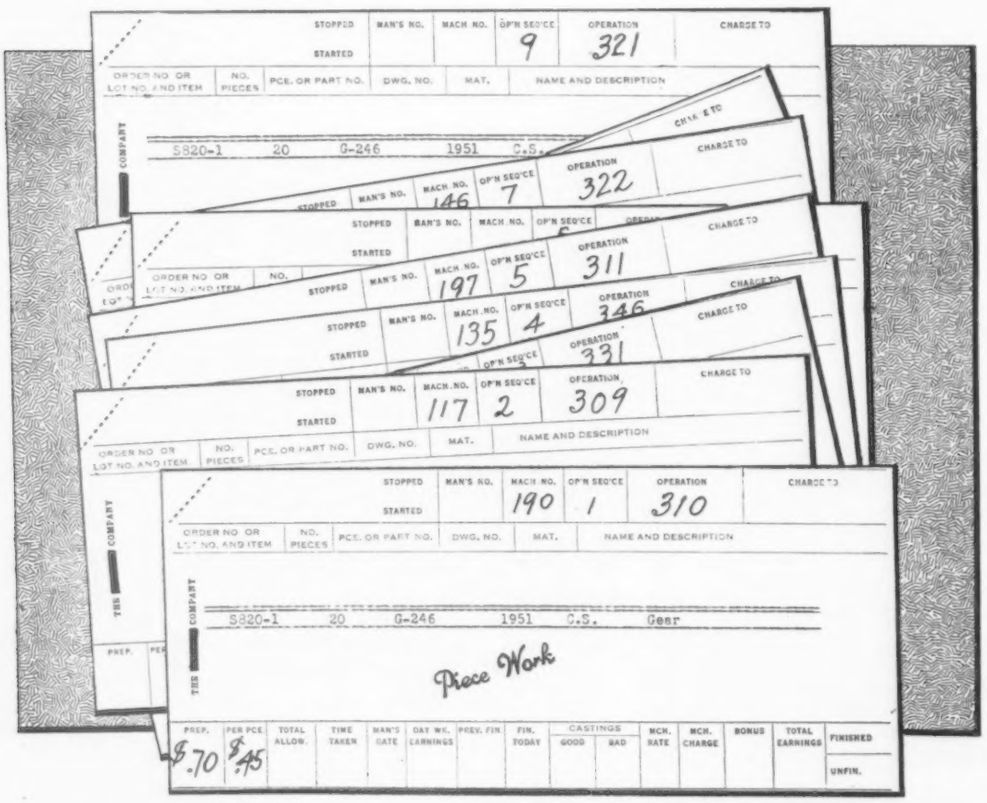


FIG. 4.—When the Shop Order Sheet Is Duplicated (see Fig. 3) a Complete Set of Castings Issue, Time and Other Cards Shown on This and the Opposite Page Are Hectographed from the Original Shop Order Sheet. These cards are assembled and clipped together, forming a package for each part or lot to be manufactured, and are arranged in the order in which the shop will use them

The four slips shown above are the first to be separated from the package of cards. They are used to bring the material to the shop. The nine time cards, at the left, are for the successive operations to be performed on the piece. From the last operation the finished work goes to the stockroom, it being on a stock order, and therefore the stores credit and two transfer slips, shown on the opposite page, are required

950. In November, 1926, machine shop hours were 3640 and this had dropped to 2500 hours by May, 1927, due almost entirely to the new method of scheduling work through the shop. In the fifth month of 1927 piece work was installed and by September, 1927, machine hours had dropped to 1950.

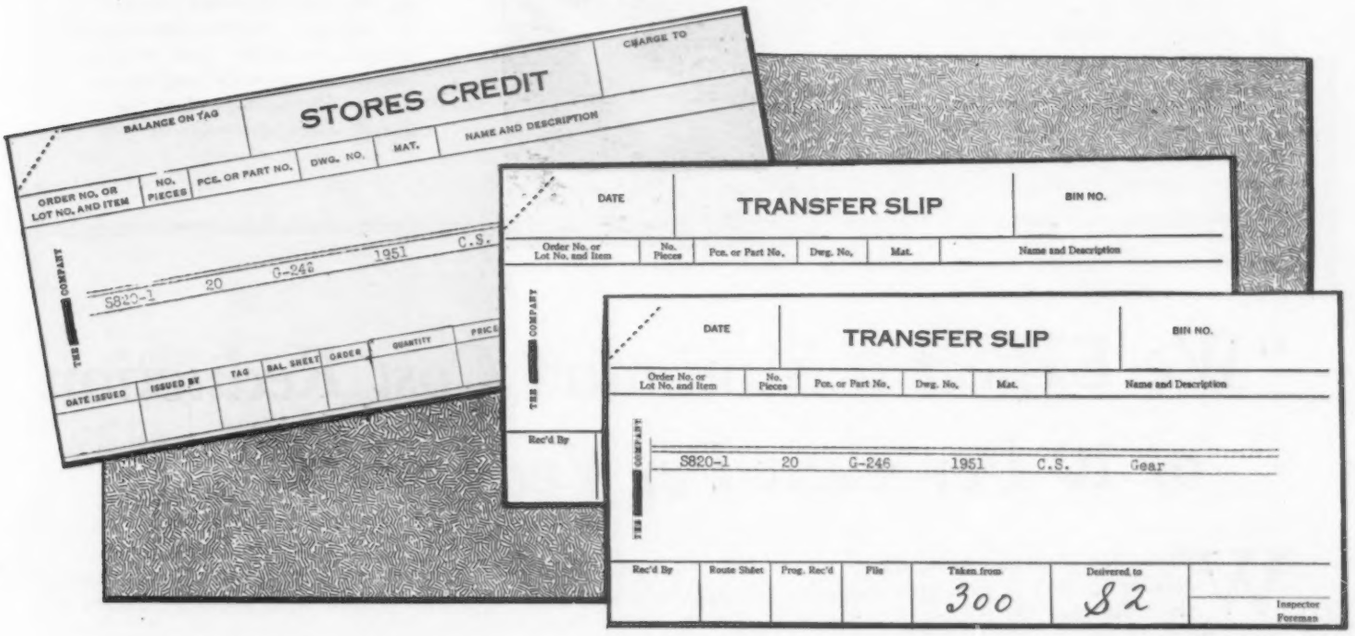
The top curve shows the combined hours in the machine shop, structural shop and in the erecting department required on the model "A" machine. It is to be noted that total hours in September, 1926, were 7424, while in 1927 the figure had dropped to 4597. The dotted curve, marked model "B" machine, represents a total for departments previously listed and indicates that similar economies are being effected regardless of the type of machine that is on regular production through the shop. Similar methods of procedure in the structural layout department have resulted in a 60 per cent reduction in labor hours.

1. The shop order, card and tag system is complete and is designed so that all instructions are hectographed from one typed sheet, thus eliminating errors resulting from copying.

2. Drawings are kept up to date and they are in the hands of workmen only as long as the various jobs are on the machines.

3. The foreman again has become a supervisor, free to direct and plan so that each machine is continuously provided with work.

4. Machines are kept in good repair and they are operated at capacity. Foremen and the time study man train operators to work to the best advantage of all.



Working of System Requires Small Increase in Payroll

In addition to increased production and lower costs, the following advantages have been derived from this system:

5. Continuous compilation of time and cost data is in effect.

To keep this system working there are required on the payroll five additional people whose salaries total about $500 a month. They are a typist, a time study man, a cost girl, an extra timekeeper and a boy who operates the hectograph machine.

Position in Industry of the Purchasing Engineer

DISCUSSING how the growth of plants and questions of costs have put engineering in the purchase of mechanical supplies and equipment, Carleton Reynell, McClellan & Junkersfeld, New York, told of the position in industry of the purchasing engineeer in a paper presented at the recent Kansas City convention of the National Association of Purchasing Agents.

"Practically every manufacturer of equipment and supplies," said he, "today employs sales engineers either to handle direct sales or as missionaries. A constant stream of salesmen and sales engineers flow through the office of the purchasing engineer daily and describe in detail the equipment they have to offer. Through them the purchasing engineer learns of the latest developments in various mechanical fields, selects those ideas which seem to apply to his problems and investigates them thoroughly in conjunction with the chief operating engineer.

"In short, he acts as the preliminary commercial research man always on the lookout for something new. He brings to the attention of the operating engineer only the ideas which would be ultimately economical, and while of course many of these are discarded in conference, the best are selected for trial.

"That purchasing has long been a function of engineering is evidenced by some of the ideas borrowed from the engineering profession by purchasing and other commercial departments. All the curves picturing business conditions, and now used to illustrate nearly every phase of business, base their origin on the analytical geometry and graphic statics developed years ago for engineering use. The purchasing engineering departments of some of our largest companies have, as you know, gone far in the development of these curves, combining market prices, production costs, freight overhead, profit and all other factors which enter into the ultimate cost.

"To approach more nearly a perfect balance of ideas on mechanical purchases many large corporations have wisely decided that it is best to consider each purchase separately from two angles, the commercial and the technical, and then agree on a final decision, after which the commercial man with technical knowledge can best handle the business end of the problem."

MR. LINCOLN, the author of this article, is vice-president of the Lincoln Electric Co., Cleveland. He joined the Lincoln organization in 1907, upon leaving Ohio State University, and took over the management of the company in 1914. He has been active in the applications of electric welding for several years and is prominently identified with the industry.

SOME of the developments of the Lincoln company since Mr. Lincoln's connection with it are: Variable voltage welder; use of arc welding in place of cast and riveted parts, including buildings and bridges; development of the automatic carbon arc welder and of the "electronic tornado" automatic welder described in THE IRON AGE *of June 28.*

"We Expect a Minimum Cost Reduction of 10 Per Cent Per Year," says J. F. LINCOLN

WE are not sure that setting this standard at a definite figure is a good or a bad thing. Indications are that the tendency always is not to go beyond the mark set, in spite of the fact that it may be possible to do so, and therefore this 10 per cent may be acting as a limit rather than a goal.

Cost reduction has been so rapid in the past few years in nearly all lines that a reduction of 10 per cent now seems under, rather than over, the proper standard. I think it is safe to say that when value, wage rates, and cost of raw materials are taken into consideration, that the automobile industry has reduced its cost by more than 10 per cent per year for the last ten years.

Three Fundamental Principles In Cost Reduction

In getting this reduction we have adopted, at our plant, three fundamental principles which we believe are essential in accomplishing the result:

The first of these is accurate knowledge of costs.

The second is an attitude of mind which regards all processes and methods as only temporary makeshifts and holds that there is always a better method of doing any job if one only had the vision and ingenuity to find it.

The third essential is the adoption of one or more manufacturing development principles.

These three principles are actually applied as follows: No one at our plant can tell from the total cost of a finished product whether or not it is too high; all of us can tell fairly accurately whether or not a single operation is too high. The only way we know of appreciating these differences is by determining all costs to their last detail so that we are dealing with individual operations on individual parts. After this has been done it is comparatively simple to deal with each operation and with each individual piece of raw material and see whether a new method of doing that particular operation can be devised. Very few cost systems give this information in the detail, accuracy and recency which is necessary to make the picture plain enough so that the management can, from the picture, see what the next step should be.

The accompanying chart shows the cost of a certain line of equipment over a period of years. The broken line is the normal cost referred to a standard rate of overhead; the red line is the actual cost including the actual rate of overhead. Data of this kind are interesting and are undoubtedly valuable as an indication of what the entire organization is doing, and from a curve of this kind the management can see whether progress is being made or not. But it is of no value whatever in pointing out what management should do in order to correct the situation and to reduce the cost. It is only the detail cost on each operation and on each piece that would be of any value in indicating the actual steps that should be taken.

Every Process or Method Is Temporary

The second fundamental principle is the definite belief that every process, every manufacturing method, is always a temporary makeshift. The only reason that a better method is not used is because the management and engineers have not the vision and ingenuity to see what that new method is. As long as that attitude of mind is maintained management is on the continual lookout for different methods, different machines for manufacture, and different designs which will better the product and reduce its cost. To illustrate how this point of view works out I will cite the following recent occurrence at our plant: The superintendent came to the chief engineer with a rotor spider, saying that he was sure the manufacturing method was wrong because the records showed we had been manufacturing this part in exactly the same way for five years. The fact that everyone else was making these spiders in the same way did not make any difference. Investigation of this particular part showed that by a change in design and construction a very much better spider could be made at

less than one-third of the previous cost and without many of the handicaps which the old part had.

It may perhaps seem a rather radical point of view to take that all processes and methods are wrong. A glance back at the history of manufacturing, however, would prove this conclusively. There is no doubt that history will prove that any process on an average is antiquated within five years. If it is going to be antiquated within five years, why wait the five years? If we only had the vision we could antiquate it immediately and not wait for development. The organization that can beat obsolescence and arrive at the new method before its competition does is the successful organization.

The locomotive of 1823 was thought at that time to be a marvel of efficiency, power and speed. Economically it is absolutely useless today, and was absolutely useless within a very short time after it was built. The same development is antiquating nearly every mechanical device. This is what we call progress. Since history shows that nearly every device which mankind has ever used has been discarded for a better and cheaper device within a short time, is there any reason why we should think that the present methods, machinery, designs, construction, have any more worth than those which we have been discarding continuously throughout our lives? Is there any proof at all that we have arrived at the millennium, or are even approaching it?

The big manufacturing job, then, becomes the forecasting of development and doing it before anyone else. Any concern that can do this will be enormously successful; the concerns who are not successful are those who do not do it.

"Show Me" Attitude Needed In Buying

Very closely connected with this matter of forecasting manufacturing methods, is intelligent buying. The Shaw Publishing Co., Chicago, investigated the buying habits of a large number of representative manufacturing companies and found that in purchasing machinery at least half the companies bought after making inquiry only to one supplier of the type of machine wanted. It may be, of course, that a thorough investigation had been made beforehand, but from my own experience this is doubtful.

Since manufacturing methods and designs are scrapped at least once every five years, it is probable that no manufacturer remains in the lead in his product continuously. To buy without investigation of what the market affords from a concern because on a previous occasion it has furnished satisfactory equipment or even furnished at a previous time the best equipment obtainable, is, to say the least, dangerous.

It seems to me that the very foundation of intelligent buying must be the idea that conditions are continuously changing and that because of this it is essential that all types of any product be continually investigated and bought on the results of that investigation. Blind buying of nameplates and buying from friends are two of the most insidious wastes that industry now supports.

In general the raw material, supplies and machinery are from three to ten times the cost of labor in the cost of any product, hence the chance for saving in buying is very great if approached by the same "show me" attitude of mind that is adopted in judging manufacturing methods.

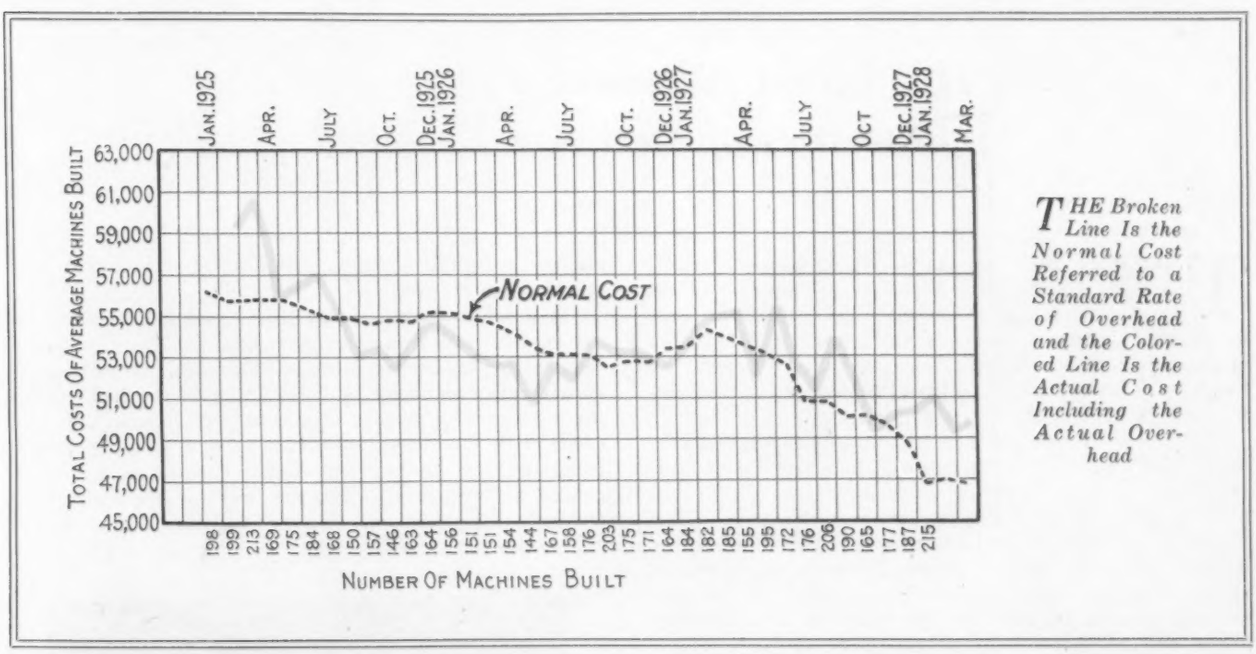
This is the gospel on which the manufacturing methods, designs, and points of view of our whole organization are based.

Modern Manufacturing Principles Must Be Adopted

The third fundamental principle which we have adopted is the application of modern manufacturing methods. In our own case one of these principles, which our company has originated and developed, consists in the substitution of welded steel for cast iron, and we have been able within the last 15 years to make almost a clean sweep of the iron casting used previously. Since steel is five times as strong, two and one-half times as stiff, and one-third as costly per pound as a casting, the marked advantage made possible by this substitution is self-evident. That we have in practically all cases been able to accomplish this purpose, making the saving in raw material of the purchased steel more than compensate for the additional labor and overhead cost of fabrication and welding, is evidenced by the fact that throughout the entire line where this substitution has been made we have been able to reduce our cost by more than 20 per cent of the previous cast iron cost. This is entirely aside from any cost reduction which has been made by more efficient manufacturing operations.

From this substitution other advantages flow. The first is that it eliminates patterns, pattern manufacture, pattern storage, and pattern repair; the second is that it greatly reduces inventories.

This steady decrease of costs and the consequent steady decrease of selling prices has been looked at askance by



THE Broken Line Is the Normal Cost Referred to a Standard Rate of Overhead and the Colored Line Is the Actual Cost Including the Actual Overhead

(*Concluded on page* 62)

Will Bessemer Production Drop?

Not If Inherent Advantages of Process and Properties of Steel Are Exploited

BY G. B. WATERHOUSE*

THIS short discussion takes up acid Bessemer steel, because it is the only Bessemer process carried out on the American continent. The process is most spectacular, beautiful in the simplicity of its conception and capable of turning out large tonnages of steel. In tonnage, it is the second steel-making process in our country, coming next to the basic open-hearth.

The process of making ordinary Bessemer steel may be briefly described. It is carried out in a refractory-lined vessel or converter, ranging in capacity up to 30 tons. Such a vessel lies on its side to receive its charge of molten pig iron. In most steel plants the molten iron is used as it comes from the blast furnaces, being stored in mixers or mixer-ladles. In some foundries making steel castings in small converters, cold iron is melted in cupolas. The proper amount of iron is brought to the converter in a ladle and poured in. This operation of charging is shown in the photograph at the head of this page, taken at the Illinois Steel Co. The blast is then turned on and the vessel turned up, the air generally passing through a hollow trunnion to the blast box under the converter, through a large number of small tuyeres and then through the metal. The blow or heat lasts for from 12 to 20 min. The silicon and manganese of the pig iron are oxidized and pass into the slag, although some manganese is volatilized. Considerable iron is also oxidized, mostly entering the slag. Carbon burns, giving rise to the large carbon flame. Such a flame is strikingly shown in a photograph of a converter in blow taken in the Lackawanna plant of the Bethlehem Steel Co. and reproduced in the full page engraving. Toward the end of the blow the flame drops, showing that the carbon has almost all been removed, the vessel is again turned on its side and the blast shut off. This operation is also spectacular and is well shown in the view at the bottom of this page, also taken at the Illinois Steel Co. The vessel now holds "blown metal," which contains very low percentages of carbon, manganese and silicon, but all the phosphorus of the original iron and almost all the sulphur. It also contains fairly large amounts of dissolved oxide of iron.

In order to be made into steel, certain final additions are needed to deoxidize the metal and give the composition required for the desired physical properties. These final additions vary; they may be added either in the converter or the ladle, or both, but the usual addition is ferromanganese added with the stream of metal while it is being poured from the converter into the ladle. (A pile of ferromanganese is shown on the platform near the converter being charged with molten pig iron.) The ladle is then usually

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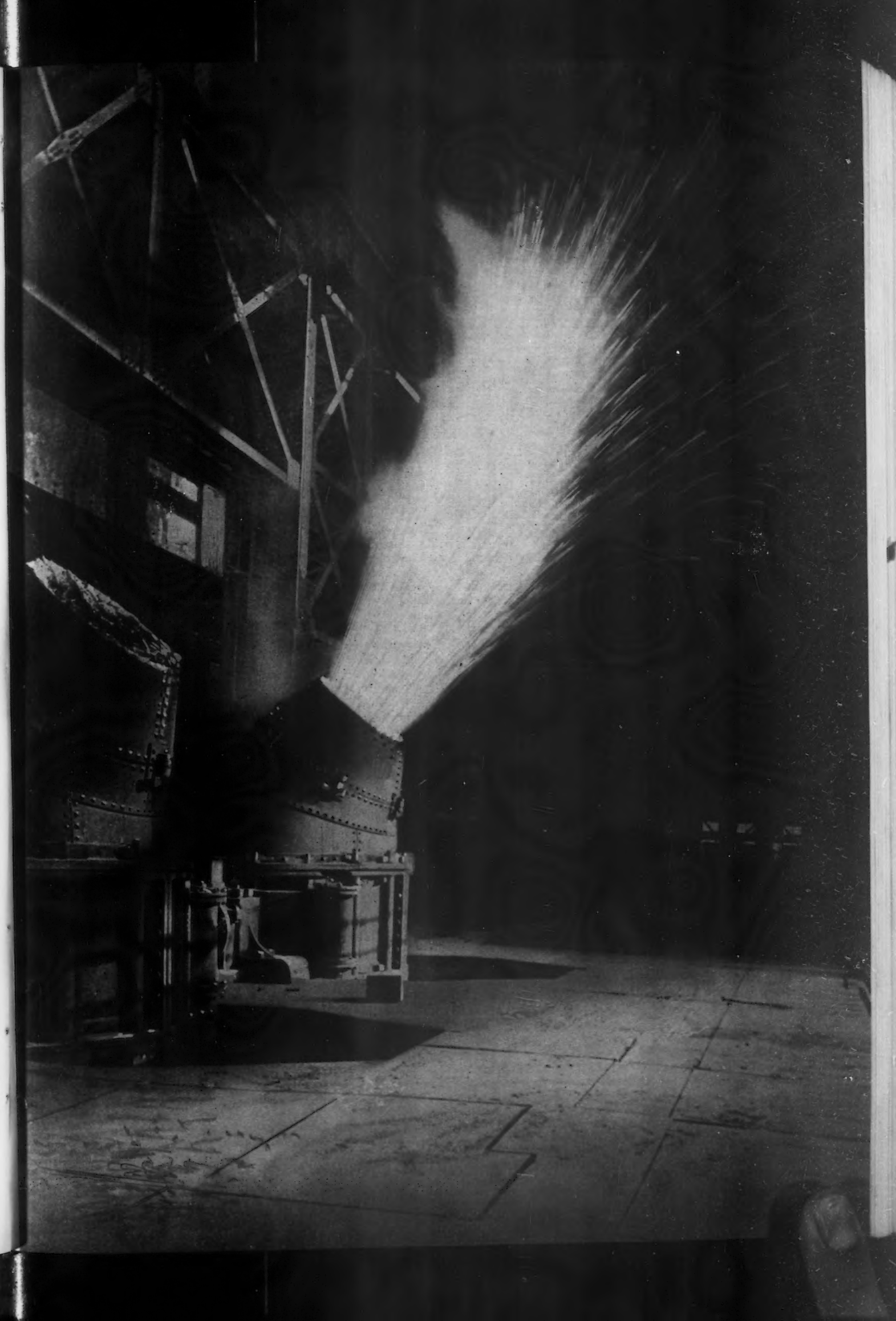


brought into position at the pouring platform, the metal is poured into ingots and the ingots of Bessemer steel are taken to the rolling mills for subsequent treatment.

A large tonnage of material is handled through the Bessemer converter and then transferred liquid to basic open-hearth furnaces for further refining. The product is usually called duplex steel and, in statistics, is included in the open-hearth total.

The statistical position of acid Bessemer steel production is shown by Table I, most of the figures of which are taken from the bulletins of the American Iron and Steel Institute.

Without going into an exhaustive analysis of these figures it may be pointed out that the Bessemer is a very important steel-making process, but, with a slowly declining trend, the percentage of the total tonnage has been decreasing until today it accounts for about 14 per cent of the total tonnage, or 19 per cent if the duplex steel is included. Duplex tonnage also appears to be slowly going down. This should really be placed in a different category, because it does not handle low-phosphorus pig iron nor make Bessemer steel, but treats higher phosphorus metal which is then sent to the basic open-hearth. The tonnage made of duplex steel depends closely upon economic conditions, principally the amount of scrap available for the open-hearth, its price and the tonnage requirements of the individual open-hearth plants.

Confining attention to straight Bessemer steel, it is a material that offers advantages over other steels for certain purposes. This is particularly true when it comes to free-machining and welding properties. For high-speed automatic screw stock Bessemer steel has never been surpassed. The very large tonnage of steel used for automatic screw machine products seems therefore preempted by this process. The demand for such material is increasing, the steel being either hot rolled or, more usually, cold rolled or drawn. A comparatively new development is the use of such material for case-hardened products, with splendid results. Its free-machining, together with its good welding properties, makes Bessemer steel valuable for butt-welded and lap-welded pipe, particularly the smaller sizes which are frequently cut, threaded and fitted in the field. A short, but rather general, questionnaire would indicate that Bessemer steel is holding its own in the field of skelp, particularly for making the smaller sizes of pipe. On the other hand, a demand for seamless steel pipe in certain sizes is causing the use of open-hearth steel; the specifications of many of the oil companies for open-hearth steel are also lessening the demand for Bessemer steel in tubular goods for the petroleum industry.

A large tonnage of Bessemer steel is being used for wire products, including wire nails, fencing, and the finer sizes of wire, and a great deal is rolled into sheet bars for making sheets, tin bars and tin plate. Its inherent stiffness is often an advantage in wire or sheets, but for deep-drawing stock the dead soft open-hearth steel seems to be preferred. A considerable tonnage of Bessemer steel is still used in the form of bars, small structural shapes and for railroad purposes, such as spikes, bolts and nuts. The addition of copper in the usual amount of 0.20 to 0.30 per cent is fairly general for material exposed to atmospheric corrosion, such as certain wire products, sheets, railroad material and other special shapes.

In concluding this brief survey of the Bessemer steel situation it may be pointed out that the future promises that this method of steel manufacture will not only hold its own but improve its position. The reserves of Bessemer ores are larger than was recently supposed. As a method of steel making it is capable of good control, and for many purposes, as indicated, the steel offers advantages.

Table I—Production and Percentage of Steel Ingots and Castings by Processes

		Basic Open-Hearth		Duplex		Bessemer	
Year	Total Gross Tons	Tonnage	Per Cent	Tonnage	Per Cent	Tonnage	Per Cent
1913	31,300,874	20,344,626	64.9	2,210,718	7.06	9,545,706	30.5
1914	23,513,030	16,271,129	69.2	835,690	3.55	6,220,846	26.4
1915	32,151,036	22,308,725	69.3	1,781,491	5.54	8,287,213	25.7
1916	42,773,680	29,616,658	69.2	3,436,457	8.03	11,059,039	25.8
1917	45,060,607	32,087,507	71.2	3,791,830	8.41	10,479,960	23.2
1918	44,462,432	32,476,571	73.0	3,870,017	8.70	9,376,236	21.1
1919	34,671,232	25,719,312	74.1	2,819,785	8.13	7,271,562	20.9
1920	42,132,934	31,375,723	74.4	3,279,119	7.78	8,883,087	21.1
1921	19,783,797	15,082,564	76.2	840,251	4.24	4,015,938	20.3
1922	35,602,926	28,387,171	79.7	1,651,089	4.63	5,919,298	16.6
1923	44,943,696	34,665,021	77.1	2,919,286	6.49	8,484,088	18.8
1924	37,931,939	30,719,523	80.9	2,131,856	5.62	5,899,590	15.5
1925	45,393,524	37,087,342	81.7	2,797,318	6.16	6,723,962	14.8
1926	48,293,763	39,653,315	82.1	2,815,980	5.83	6,934,568	14.3
1927	44,935,185	37,144,268	82.7	2,184,674	4.86	6,191,727	13.7

While considerable research is being carried out in order to improve the quality and extend the usefulness of Bessemer steel, there is need for still more work along these lines. Some of the methods used in making high-quality steels by the open-hearth and electric furnace can be applied to the Bessemer process, particularly in obtaining sound steel ingots and steel more free from non-metallic impurities than is usual at present. It is believed that, if proper attention is paid to having the right kind of pig iron, if proper and in some cases improved Bessemer plant and equipment is provided, and if increased care is given to the finishing of the steel, to ladle practice and pouring practice, the Bessemer converter will produce metal superior to the ordinary run of tonnage steels made today and increased uses can be found for such qualities. This, as mentioned before, will enable this method not only to hold its own in the fields now occupied, but will increase the tonnage made and the steel used in other lines now closed to it.

What of the Cost of Buying?

Who knows today which costs the most—to shop among 50 vendors or to establish a close cooperative relationship with 12? asked Earl Whitehorne, commercial editor of the *Electrical World*, New York, at the recent Kansas City convention of the National Association of Purchasing Agents. "How much more does it cost to interview 50 salesmen than to give the same time to representatives of six selected suppliers who qualify completely in all the other factors of value?

"There are four things to be done:

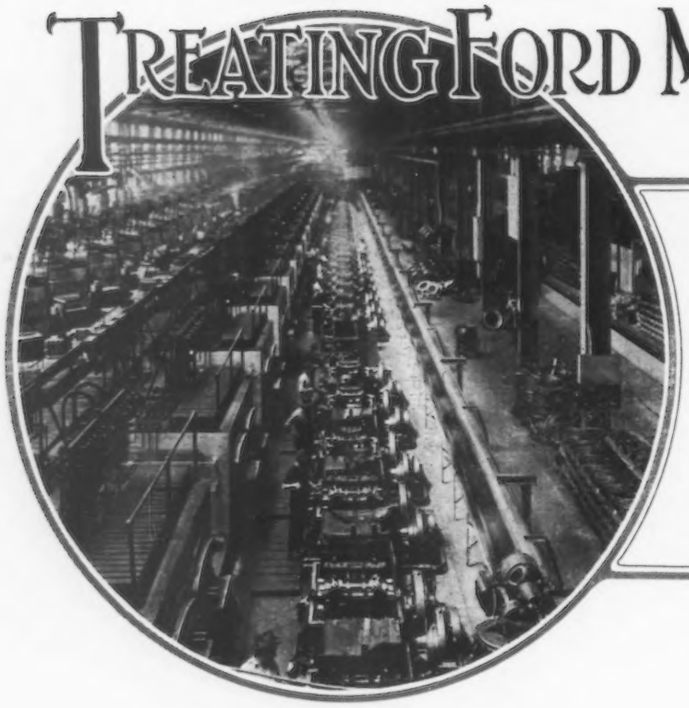
"1. If the purchaser would demand firm bids, then general price cutting would soon cease. For a firm bid is like a signed order. It's the word of the house. It puts industry on the one-price basis just as solidly as the modern department store. It means that a price made is the best and final price and the buyer is expected to place the business by selecting the firm bid that offers the best value—not price alone but value.

"2. While this practice of firm bids is crystallizing into a custom, whenever bidders are called back by a purchasing agent and asked for a better price, let the bidder demand that the other bids be shown to him, so that he will know that he is not being lied to, and that his price is indeed high for equal value.

"3. And while the trickery of baiting bidders still continues in the world of business, let bidders hold post mortem comparisons of bids, by submitting their bids on closed business to their trade associations for comparison and report.

"4. And let the buyer frankly and publicly proclaim that he will thereafter shun the man who cuts his price, because the first price is supposed to represent the honest value of the goods, and the man who cuts stands self-convicted either by trickery or weakness."

Treating Ford Model "A" Parts



Heat-Treatment Schedule for Shafts, Axles and Gears—Continuous Gas and Electric Furnaces Handle Production

BY FAY LEONE FAUROTE*

SPEAKING generally, the Ford Motor Co. uses some ten different types of steel in the new Model A. These include chromium-vanadium steels, chromium steels with extra manganese, high manganese steels, nickel steels, Bessemer stock, carbon key stock, low-carbon basic open-hearth steels, special electrical alloys for starters and generators, and pure iron for pole pieces. Taking into consideration all grades and classes used for production and non-production jobs, the list may be extended to over 50 varieties.

It is Ford's practice to designate steels by colors painted on one end of the stock. If on the low side of an analysis the steel is also painted white, or if on the high side, white with a green stripe. Men in charge of inventory may thus see at a glance what stock is available and what its chemical composition is.

Furnaces Put Wherever Needed in Production Line

Since the physical characteristics of steel are largely determined by the succeeding working and heat treatments, it is not surprising to find heat-treatment furnaces and operations forming no inconsiderable part of the process lines. Indeed, it is in these departments that some of the most interesting automatic machinery, conveyors, electric and gas furnaces are found. In such a large production there is a need for handling a vast quantity at one time and maintaining a constant procession of parts so that in no minor assembly will there be a shortage. This has forced the installation in many of the bays of conveyor furnaces, some continuous, others intermittent, with mechanical methods of quenching, tumbling or cleaning.

Tempering or drawing is also often performed in furnaces automatically controlled and mechanically fed. Where annealing is necessary interesting forms of apparatus have been devised whereby this slow cooling may occur under conditions of travel or over baths which, while chilling one part of the piece, may allow the other to gradually drop in temperature, thus producing in a single part those variations of structure and physical characteristics best suited to its use.

A good example of this may be seen in Fig. 1, showing the heat-treatment operations on the outer end of the rear axle housing. In the background is the discharge end of an electric furnace. Stock moves through by an automatic pusher which feeds in five parts at a time, one in each groove. Reaching the required temperature (which, incidentally, is controlled by an automatic recording device), the parts are removed one by one and placed in a quenching device which cools only the lower portion, the upper half remaining at the higher temperature. This quenching frame holds four parts and as fast as the workman in the center can remove them to the conveyor alongside, the workman in the background puts others in their place. The device is so timed that the forging remains in the quenching frame only long enough to harden the lower section, after which the upper is allowed to anneal in the air while the lower travels along the surface of the water to the end of the bath. Then complete immersion cools the entire piece to handling temperature, and it is removed by a third workman.

Double-Deck Furnace Saves Space

It is sometimes necessary to complete the entire heat-treatment cycle in a very small space in the process line. Thus the crankshaft is heated, quenched and drawn in a very limited area. Fig. 2 shows two electric furnaces, one above the other, economical in both heat and space. Adjoining them is a special quenching machine.

The crankshaft is made of hot-rolled steel of the following composition: carbon, 0.35 to 0.40; manganese, 0.70 to 0.90; silicon, 0.07 to 0.15; phosphorus, 0.03 maximum; sulphur, 0.05 per cent maximum. After forging, it is normalized at 1560 deg. Fahr., air cooled, and then machined. The parts are fed from the far end through the lower, or hardening, furnace shown in the view by an automatic pusher device. The workmen remove each crankshaft as it appears, heated to 1500 deg. Fahr., and place it between the jaws of a rotating quenching machine at the right, which immerses the part in caustic solution. After the proper quenching time has elapsed, the machine presents the part at the opening again ready for tempering. The workman then drops it into the projecting hooks of a chain conveyor

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which carries it through the upper furnace. There it is drawn at 650 deg. Fahr. to meet a Brinell hardness of 402 to 444. The front end is then redrawn to meet a Brinell hardness of 302 to 364, and the flange is drawn higher still to give a hardness of 228.

A similar unique electric furnace and quenching device makes the heat treatment of the Ford Model A camshaft worthy of notice. The furnace is round like a turret and consists of a rotating hearth or table, upon which the camshafts are laid one at a time as the table revolves past the door. The speed of the hearth is so timed that when the revolution has been made the shaft is at heat. After each end is given a preliminary quench, the shaft is hung in a vertical position in a rotating quenching bath of caustic soda, which automatically completes this portion of the heat treatment without further attention.

Differential heat treatments—that is to say, methods whereby one portion of a part receives one treatment and another a second treatment so adjusted to produce correct properties for the required duties of the various portions—are fairly common. The Model A rear axle shaft, for instance, is made of a piece of hot-rolled steel of the same chemical composition as the crankshaft. It is heated to 1480 deg. Fahr., and withdrawn when it has reached a temperature of about 350 to 400 deg. Fahr. It is then placed in a combination gas-electric furnace having longitudinal baffles dividing the hearth into three heat zones. The gear end is thus held at about 300 deg. Fahr. to preserve full hardness for gear wear, the central portion is heated to 500 deg. to meet a Brinell hardness of 477 to 512 and the wheel end to 800 deg. Fahr., thus giving the latter portion a Brinell hardness of 302 to 340, suitable for cutting a keyway and threading.

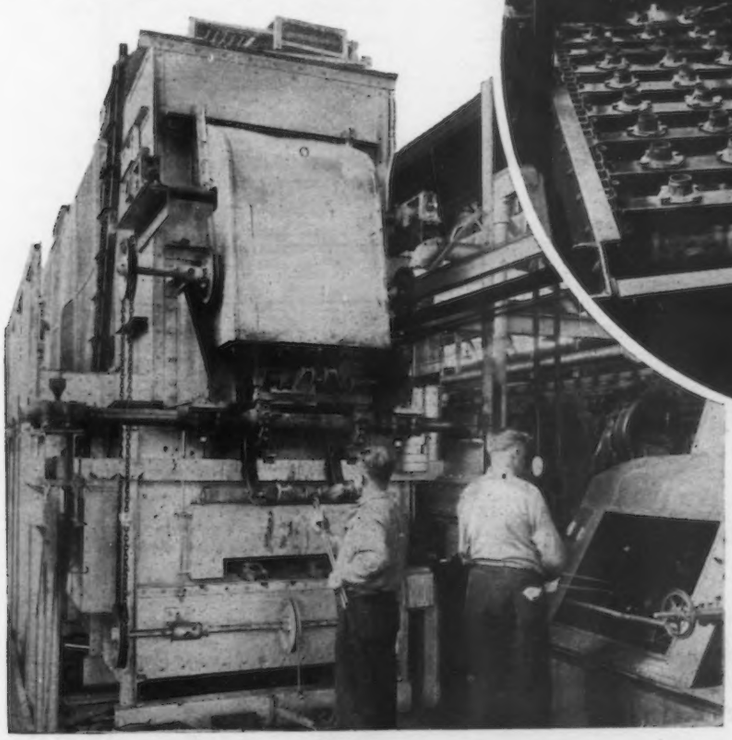
Uniform Temperatures in Gas Furnaces

Gas furnaces are largely used at the Highland Park plant. A continuous annealing or normalizing furnace of typical design is detailed in Fig. 3. Fig. 4 shows such a unit, from the discharge end, placed in line with a tumbling barrel for cleaning scale from normalized gear blanks before cutting the teeth. (These rings for differential gears, by the way, were originally a flat bar, but have been curled edgewise and butt welded into a complete circle.) As shown in Fig. 3, the incoming end of the furnace is heated by Surface Combustion burners with 1¼-in. nozzles, ranged three on a side, staggered or alternate spacings being 3 ft. 4 in. apart. The combustion zone is separated from the work by a false arch, perforated with about 170 holes, 2 in. in diameter. After playing upon work sliding through on the rails, the hot gases go down into the checkerwork below the hearth, and are withdrawn through a central slot into a series of 13 vertical flues 4½ in. square, built in the side walls and connecting with a breeching built above the furnace, or into longitudinal flues below the floor level. Passing through this heated portion of the hearth, the work enters an unheated extension, with a descending roof. The hearth of this latter portion is built on three arches, principally to economize on brick work, and to provide ventilation through doors in the steel buildings up through wide slots at each side of the hearth.

Such a furnace has a hearth area of 43 sq. ft., can heat approximately 2500 lb. of steel per hour to 1550 deg. Fahr., and consumes 4530 cu. ft. of 530-B.t.u. gas per hour. The total flue area is 490 sq. ft.

At Fordson there is a growing tendency to use electricity for heating and heat-treatment operations. Many of the new installations use a ribbon heating element. Results are justified by the more accurate control of heat, general cleanliness, quietness of operation and simplicity of control. There is little outside radiation, so the workman can stand close to the mouth of the furnace without discomfort.

The ability of various parts to stand up under road con-



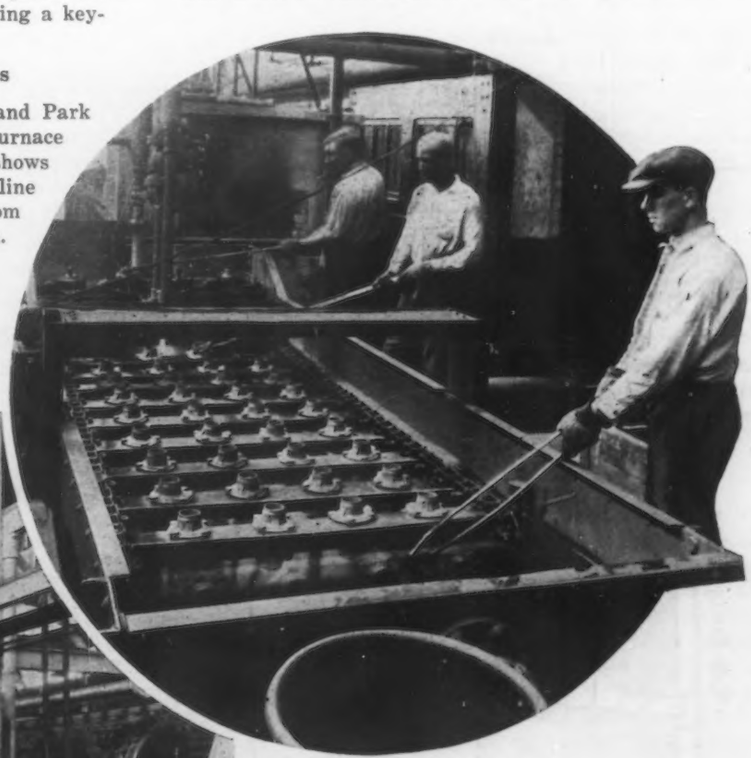


Fig. 1.—Machine for Quenching Flange Only of Rear Axle Housing Forging (Above)

Fig. 2.—Hot Crankshafts Emerge from Lower Furnace, Are Quenched in Special Device at Left, and Are Drawn in Upper Deck

ditions depends very largely upon the heat treatment. Ford parts are light but unusually strong. Therefore a few exact heat-treatment specifications will be of interest to production and metal-working executives.

Many parts, among them the following, are made of a medium-hard carbon steel with the following chemical composition: carbon, 0.35 to 0.40; manganese, 0.70 to 0.90; silicon, 0.07 to 0.15; phosphorus, less than 0.03; sulphur, less than 0.05 per cent.

The differential gear case is heated to 1470 deg. Fahr., quenched in water, and drawn at 1000 deg. Fahr. to a Brinell hardness 228 to 286.

The valve push rod is made of 0.6-in. cold heading wire, upset, counterbored and finished all over. Heat treatment: Heated to 1470 deg. Fahr., quenched in water, removed from quench at 350 to 400 deg. Fahr. to meet specification of Rockwell hardness C-50 to C-58.

The starter drive pinion is made of 1.44-in. cold-drawn steel, selected. Its surface is practically covered with gear and ratchet teeth, and the reamed counterbore must be maintained smooth and straight for 1⅛-in. length between the limits of 0.788 and 0.792 in. Heat treatment: 1470 deg. Fahr. in cynade 10 min., quenched in oil. Surface must be file-hard.

The front brake operating wedge is made of hot-rolled steel. Heat treatment: Heated to 1470 deg. Fahr., quenched in water, annealed at 450 deg. Fahr. to Rockwell hardness C-48 to 52.

The rear spring perch is an intricate forging made of hot-rolled steel. Heat treatment: Normalized after forging to meet a Brinell hardness of 143 to 196, then machined. A ball-shaped projection only is heated in cyanide at 1500 deg. Fahr. for 2 min. and quenched in water to file hardness.

The clutch disk is forged from 2 3/16-in. hot-rolled rounds. The drum is 3.66 in. in inside diameter, 2 9/32 in. long, and has gear teeth cut on its outer surface. Splines in the hub bore are broached, and the whole piece is held to within two or three-thousandths for eccentricity and flatness. Heat treatment after forging: Heated to 1470 deg. Fahr., quenched in water and drawn to 1000 deg. Fahr. to produce Brinell hardness of 255 to 302. After machining all over, it is heated to 1350 deg. Fahr. in cyanide and quenched in oil for a file-hard surface.

Treatment of 1 Per Cent Chromium Steel

A number of important transmission parts are cut or forged from a low-chromium steel of the following chemical composition: carbon, 0.35 to 0.38; manganese, 0.65 to 0.80; chromium, 0.90 to 1.10; silicon, 0.10 to 0.20; phosphorus, 0.03 maximum; sulphur, 0.04 per cent maximum.

The transmission main shaft is first annealed at 1650 deg. Fahr., held 1 hr., cooled in furnace to 1150 deg. Fahr.

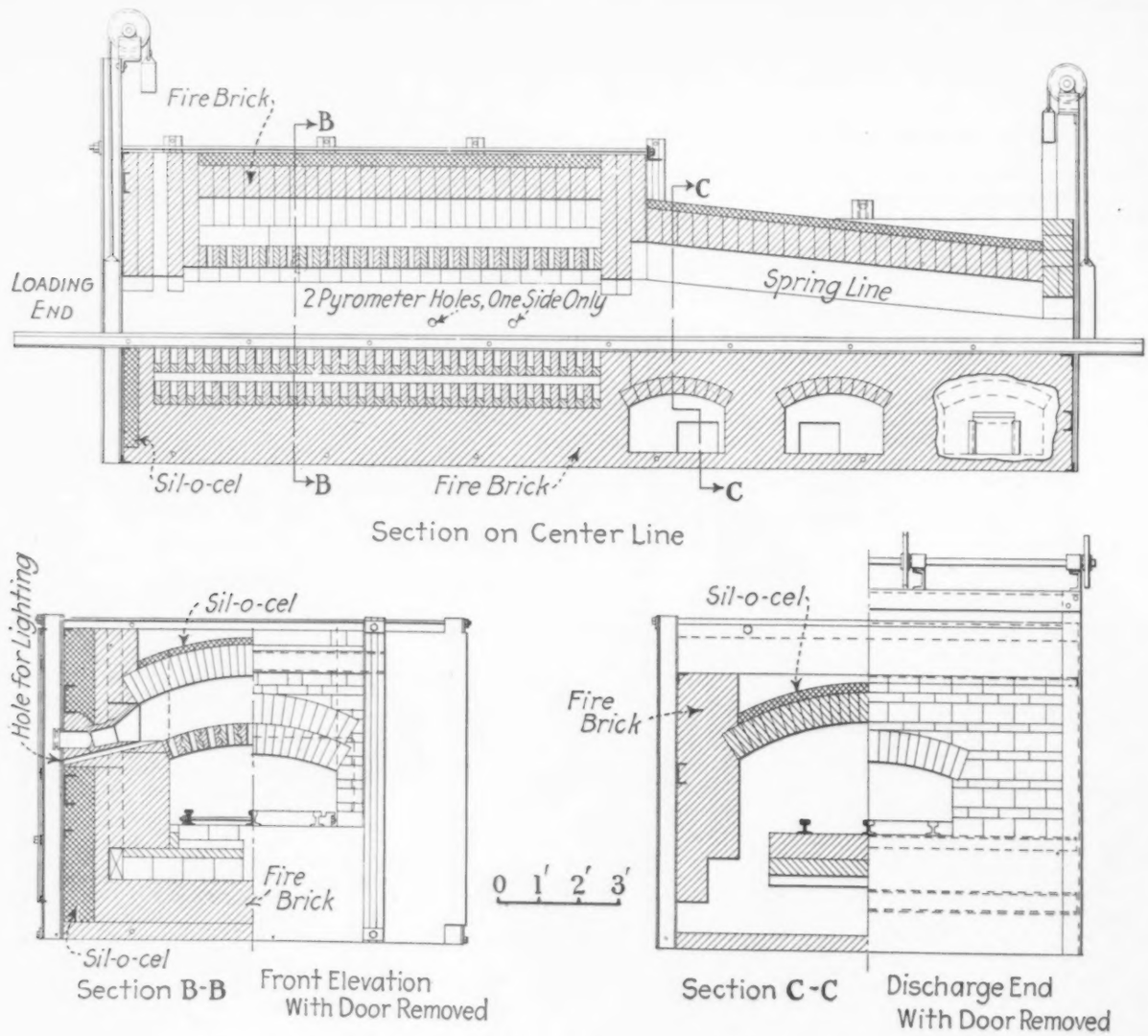


Fig. 3.—Construction Details of Typical Gas-Fired Annealing or Normalizing Furnace

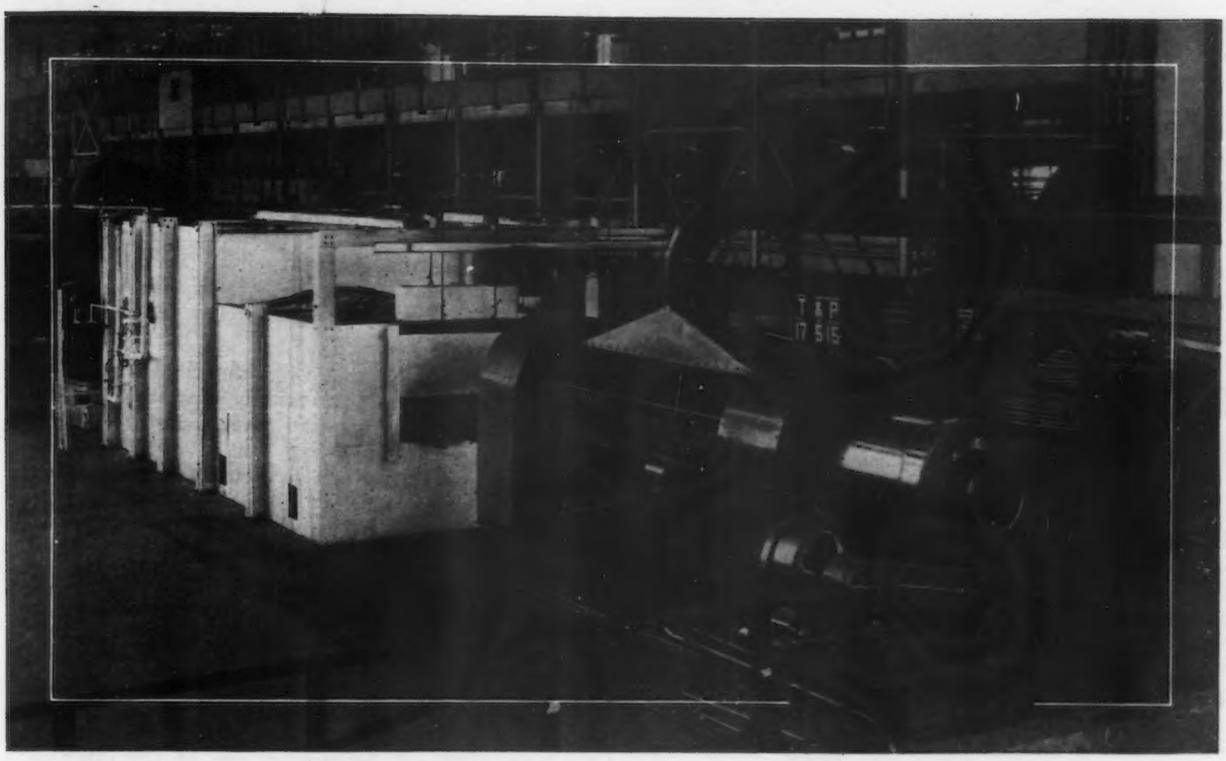


Fig. 4—Normalizing Furnace and Tumbling Barrel for Handling Welded Blanks for Differential Ring Gears

and finally cooled in air to produce a Brinell hardness of 187 to 217. It is then machined. Final heat treatment is: Heated to 1500 deg. Fahr. in cyanide, quenched in oil, drawn in oil at 400 deg. Fahr. 1 hr. to a Brinell hardness of 477 to 532 or a Rockwell C scale hardness of 48 to 53.

The various transmission gears are taken from the low side of this chemical specification, and previous to machining they are annealed as above to a Brinell hardness of 170 to 196. After machining, they are heated to 1500 deg. Fahr. in cyanide, quenched in oil, and drawn in oil at 400 deg. Fahr. for 1 hr. to a Brinell hardness of 477 to 532 (Rockwell hardness of C-48 to 53).

Rear axle driving gears are held in cyanide somewhat longer and, after quenching and drawing, must be file-hard.

The differential driving gear is a steel forging. After forging, it is brought to 1650 deg. Fahr., taking 1 hr. to reach heat, and is soaked 15 min. and cooled slowly to a Brinell hardness of 170 to 207. Then, after machining, it is heated in cyanide at 1500 deg. Fahr., soaked 7 min., quenched in oil at 400 deg. Fahr. and left in oil 1 hr. Hardness specification: file-hard—Rockwell C-50 to 55.

Spindle arms and connecting rods are of lower carbon and chromium (carbon, 0.26 to 0.30 per cent; chromium, 0.80 to 1 per cent). The spindle arm is normalized at 1650 deg. Fahr. before machining, and then is given this heat treatment: Heated to 1500 deg. Fahr., quenched in caustic solution, removed from solution at 400 to 600 deg. Fahr., and drawn at 980 deg. Fahr. to a Brinell hardness of 286 to 321.

Piston pins are of still milder steel. The chemical composition is carbon, 0.10 to 0.15; manganese, 0.25 to 0.40; chromium, 0.25 to 0.35; silicon, 0.10 to 0.20; phosphorus, 0.03 per cent maximum; sulphur, 0.04 per cent maximum. Heat treatment is as follows: Carbonized at 1700 to 1750 deg. Fahr. (0.025 to 0.035 in. from finish size), normalized at 1650 deg. Fahr., cooled slowly, cleaned if necessary, taper-reamed, reheated at 1600 deg. Fahr., quenched in caustic soda solution to a hardness of C-58 minimum.

Case-Hardened Chromium-Vanadium Steel

Cyanide hardening of a chromium-vanadium steel makes a durable spindle bolt. It is forged from the following steel: carbon, 0.17 to 0.22; manganese, 0.60 to 0.75; chromium, 0.65 to 0.80; vanadium, 0.12 to 0.15; silicon, 0.10 to 0.20; phosphorus, 0.03 per cent maximum; sulphur, 0.04 per cent maximum. After cleaning, machining and grinding, it is heated in cyanide to 1650 deg. Fahr. for 15 min., quenched in oil, to test file hard and have a cyanide case with a 0.007-in. minimum thickness.

The driving pinion is forged of the same steel and then annealed at 1650 deg. Fahr. to a Brinell hardness of 163 to 207. It is machined all over and copper plated. The gear teeth are then cut, and one boss (which must also be hard) is turned down slightly. A carbonized surface of 1/32 to 3/64 in. deep is given by carbonizing at 1750 deg. Fahr. for 6 hr. Pinions are cooled in the boxes, removed, heated to 1650 deg. Fahr. 10 min. in cyanide and quenched in oil. After drawing at 400 deg. Fahr. in oil, the hardened face of the gear must have a Rockwell hardness of C-58 to 65.

Stretching of Hot Steel Studied

The high temperatures and pressures associated with developments in power plant equipment, oil cracking processes, and the chemical industries generally, have shown the need for added information on the behavior of metals at high temperatures. This applies to a variety of properties but in particular to the elongation with time, or so-called creep of metals, when subjected to fixed loads for long periods.

In Technologic Paper No. 362 just issued by the United States Bureau of Standards are given the results of so-called "creep tests" in which the elongation of metal specimens was observed when subjected to fixed loads for long periods extending in some cases for more than a year.

Tests were made on a low-carbon structural steel, a high-chromium "stain-resisting" steel, a chromium-molybdenum structural steel, high-speed tool steel, and one of the high-chromium high-nickel "heat and corrosion resisting" steels at temperatures between 70 and 1350 deg. Fahr. So-called "creep charts" are given, so that the allowable stresses, if the steel is to last for some approximate length of time and with a certain amount of deformation, may be determined.

Unite to Cut Distribution Costs

Manufacturers and Jobbers Plan Cooperative Program at New York Conference—Committees Appointed

TO develop a plan for distributing steel and heavy hardware products that will bring a fair profit to both manufacturers and jobbers, a conference of producers and distributers was held at the Waldorf-Astoria, New York, May 28 and 29, under the auspices of the bolt, nut and rivet industry. There was an attendance of 300 manufacturers and jobbers from all parts of the United States.

A sequel of the conference will be another general meeting of manufacturers and distributers in Washington to work out plans for cooperation in greater detail. Committees named in the New York conference will convene in Washington within two months to organize permanently and to ask the Federal Trade Commission to approve their program.

Producing Costs Declining, Distributing Costs Rising

"ALMOST all lines of industry, in their study of cost reduction, have confined their effort to lower manufacturing costs," said Charles J. Graham, president of the Bolt, Nut and Rivet Manufacturers Association, in an address opening the conference. "Millions have been spent in this, until today we have come close to perfection on this side of the picture. But the millions that have been saved by this method have been more than squandered by unsound selling policies, so our executives must now turn to the selling and distributing side, to stop the waste and to secure as great efficiency from this angle of their business as they are from the manufacturing side.

"The manufacturing industries of this country are not equipped to do a retail business. They do not need such equipment, for they already have set up for them in every important community in the country warehouse facilities for the proper distribution of their merchandise.

"Every jobber has his corps of salesmen who are fitted for the solicitation of general business. Their overhead expense is distributed over thousands of items, whereas the manufacturers' must be borne by one, or in any event, by a very few.

"If all of the manufacturing industries of the country, particularly in the heavier lines, would analyze their selling costs, they would find that about 80 per cent of their sales expense is producing less than 20 per cent of their volume, and this 20 per cent of the volume, were it charged with its proper portion of sales expense, plus the fact that it is also the highest cost from an operating standpoint, would be shown to be largely responsible for the total lack of profit, and in many cases entirely responsible for the losses incurred. The losses of this 20 per cent must, in the operation of their business, be absorbed out of the profits of the 80 per cent low cost volume.

"The best example I can show of the truth of this statement was published in the New York *Times* on June 17, showing where a study has been made by one of our Government departments of the sales of a very large unnamed company. An analysis was made of nearly 800,000 orders, which was 60 per cent of the total number of orders received. It was found that these orders represented only about 10 per cent of the total volume, and averaged less than $10 each. The significant part is that they showed an average loss of $1.60 per order, or about 16 per cent.

"We have at this conference not only the distributers, but representatives from almost 50 manufacturing lines. The distributers are ready and willing to perform a service for which they are adequately equipped. Their committees are organized and functioning in cooperation with the bolt, nut and rivet industry, and are in position to take on any additional duties that any of the other manufacturing lines might inflict upon them."

What Has Been Done in Bolts and Nuts

Mr. Graham briefly outlined the demoralized condition of the bolt, nut and rivet industry in 1924, when losses totaling $12,000,000 were incurred on a gross business of $75,000,000, and the subsequent improvement after organized efforts were made to solve the distribution problem.

"We organized our present association in April, 1925, and an executive committee was appointed, which made a complete study of the causes which had brought us into the demoralized condition in which we had found ourselves in 1924," said Mr. Graham. "The first study made was on cost accounting, and after a year of intensive work on the part of a special committee, headed by the assistant controller and chief cost accountant in the bolt and nut department of one of our leading companies, a cost system was devised, and made available to every plant in the industry.

Consumers Persuaded to Stop Making Bolts

"We found that many railroads and large industrials were manufacturing bolts and nuts, having been forced into it when they were unable to secure material during the war period, and also in the 1920 boom. We organized a department, with an ex-railroad man at its head, to go to these various companies with the idea of showing them they could purchase their material cheaper than they could manufacture it, and we have been successful in persuading many large roads to cease the manufacture of this product.

"In the industrial field, several large railroad car builders are now our customers, rather than our competitors. We hope eventually by this method to get back into our industry somewhere between 100,000 and 200,000 tons of product yearly, which will increase our operations and decrease our costs.

Scientific Base List of Prices Prepared

"Working in conjunction with the division of simplified practice of the Department of Commerce, we standardized our methods of packing, reducing the number of package sizes from 168 to 18. Each manufacturer now puts up his

product in standard containers, so that regardless of from whom a customer purchases, he gets the same quantity of bolts and nuts per case or keg. Another committee, working with a committee appointed by act of Congress, has been active in promoting the standardization of our product in sizes and styles. We have already reached the point where head sizes, nut sizes and thread fits are standard. However, we have only scratched the suface on this part of our program. Our basic list, from which discounts apply, was prepared as the result of a scientific study by a committee consisting of a number of the operating heads of various companies, the sales departments having nothing to do with it, so that today we have a completely scientific basic list, based on actual manufacturing costs. By using this list, every company with modern equipment should be able to make a fair return on each unit of equipment operated. The list was compiled on a machine-hour rate basis, so that the operation of a ¼-in. machine will return the same proportionate profit as the operation of a 2-in. machine, the cost of equipment, floor space occupied, cost of tools and dies, cost of maintenance and percentage of overhead all being taken into consideration.

Advantages Gained by Cooperating with Jobbers

"Our market during the progress of this work had become more stable, proving to a degree the idea we had at the start that if we would carry on what we termed a constructive campaign, our selling prices would readjust themselves and eventually the price situation would more or less take care of itself. However, we found the greatest antagonism to our fairly well stabilized market came from the distributers.

"Our investigation as to the causes of the distributers' attitude showed that we were entirely responsible for it. In our struggle to secure enough orders to run our plants to capacity, we had practically lost sight of the distributer. We had become his most aggressive competitor and were soliciting trade which, by virtue of his facilities and location, he could handle in a much more satisfactory and economical way than we could, and we were not only disrupting his trade, but our own as well.

"In consultation with a Pittsburgh jobber we suggested he appoint a committee of distributers and we would appoint a committee of the local manufacturers to discuss a possible method of bettering the condition. To determine who the large buyers of our product in that territory were, we requested the jobbers to furnish a list of all of their customers in all lines. The list contained 29,000 names. Our committee studied this list and found there were 11,000 bolt and nut buyers in the district, taking in a territory within a radius of 200 miles of Pittsburgh. Our committee studied this list of 11,000 accounts and finally selected 275 names on the list on which we made the start of our experiment.

Do Not Solicit Small-Lot Business

"The basis of our arrangement with the distributer is this: We say to him that, owing to the fact that the soliciting and handling of what might be termed the smaller run of orders is too expensive for us, we as manufacturers will only solicit business from the 275 accounts in this territory and will do everything in our power to have the balance of the trade flow through its proper channel—in other words, through the distributer. While we will not solicit trade, other than from the companies listed, we cannot legally and do not refuse to sell to the trade not appearing on this list. However, should we receive inquiries or orders from such trade, we will sell or quote them whatever prices we see fit. But we give the jobber the assurance that, on such inquiries or orders, we will each determine for ourselves as to what the average jobber's resale price out of warehouse stocks is in the territory, and will have regard for that situation.

Jobbers' Committees Organized

"The plan worked so satisfactorily to both parties in the Pittsburgh district that we determined to make it nation-wide, and carried it to every important distribution center in the United States. Our plan of operation, other than in Pittsburgh, was to secure a list of distributers in a given territory, send out an invitation for a conference, and then with a selected committee of the leading executives of a number of companies, visit this territory, explain our plan and request the jobbers to appoint a chairman, who in turn was to appoint a committee of distributers representing the territory of which this particular city was the center. We then appointed a committee of manufacturers, who subsequently met with the jobbers' committee to determine who the large buyers were in that particular territory, and to follow the same pro-

Seventeen Industries Represented on Manufacturers' Committee

AT the distribution conference a committee representing manufacturers was established. A joint meeting of this committee and the jobbers' representatives arranged for each manufacturer to call a conference of the leaders of his industry to consider a distribution plan which would best fit the needs of that industry. At these conferences delegates will be chosen to represent the different industries at a trade conference to be held in Washington later in the year, which conference will include both jobbers' and manufacturers' representatives. The committee of manufacturers follows:

Bolt, Nut and Rivet Manufacturers
CHARLES J. GRAHAM, Graham Bolt & Nut Co., Pittsburgh.

Wire Fence Industry
WILLIAM G. HUME, vice-president and general sales manager Keystone Steel & Wire Co., Peoria, Ill.

Wire and Nail Manufacturers
GEORGE W. JONES, general sales manager Pittsburgh Steel Co., Pittsburgh.

Wire Cloth Makers
GEORGE E. WATSON, vice-president in charge of sales Wickwire-Spencer Steel Co., Inc., New York.

Wheelbarrows
H. E. HAIMAN, General Wheelbarrow Co., Cleveland.

Valve and Packing Industry
JAMES R. WHITE, secretary Jenkins Brothers, New York.

Cap and Set Screw Industry
H. E. PENFIELD, Chicago Screw Co., Chicago.

Cordage Industry
J. S. MCDANIEL, secretary Cordage Institute, New York.

Abrasive Industry
WILLIAM MCGREGOR, Carborundum Co., Niagara Falls, N. Y.

Welded Chain Manufacturers
FRANK A. BOND, vice-president United States Chain & Forging Co., Pittsburgh.

Makers of Fire Fighting Equipment
CHARLES H. MEIGS, commissioner Fire Equipment Manufacturers' Institute, New York.

Cold Finished Steel Bar Industry
EDWARD L. PARKER, president Columbia Steel & Shafting Co. and Edgar T. Ward's Sons Co., Pittsburgh.

Shovel Manufacturers
C. L. BUTTS, manager of sales Wood Shovel & Tool Co., Piqua, Ohio.

Horseshoe and Calk Manufacturers
ROSS R. HARRISON, general manager Bryden Neverslip Co., New Brunswick, N. J.

Electrical Goods Industry
W. E. SPRACKLING, president Tubular Woven Fabric Co., Pawtucket, R. I.

Hack Saw Makers
WILLIAM E. CROSS, Clemson Brothers, Middletown, N. Y.

Hand Tool Industry
F. R. PLUMB, president F. R. Plumb, Inc., Philadelphia.
S. HORACE DISSTON, Henry Disston & Sons, Inc., Philadelphia.

cedure after the list was created that we followed in Pittsburgh. We now have 34 such committees organized and in operation.

"The bolt, nut and rivet industry is now actively soliciting only 2690 accounts in the entire country, including the distributers, and every bolt and nut manufacturer in the United States has a copy of this list, whether he is a member of our association or not. Naturally our competition is much more active on the desirable business than ever before. We do not have any price agreements. We meet almost every two weeks. We have worked under advice of counsel ever since our organization started, and prices are never discussed, even on past transactions. We do not dictate or even suggest resale prices to the distributers, that being entirely within their province. The result has been that the distributers' attitude has changed from one of antagonism to one of a willingness to support a stable market. They are willing and anxious to pay a stable market price, realizing fully that a stable market for them is just as important as it is for the manufacturer.

"The benefit to the manufacturer extends beyond the removal of pressure from the distributer for lower prices. The plan has developed into an important factor in cost reduction and has brought about a reduction in that portion of our expense which had been mounting higher and higher every year. Our machines are able to operate to better advantage on quantity production. Our packing expense has been greatly reduced, as the bulk of our material, at least 95 per cent of it, goes out in standard container quantities. Shipping expenses are greatly reduced, as orders now come in heavy tonnages rather than in large number with little tonnage per order. It reduces clerical help, accounting expense, stenographic expense; in fact, every item that goes into overhead."

Schwab Indorses Plan

CONSIDERABLE impetus was given the movement toward better distribution by Charles M. Schwab, chairman Bethlehem Steel Corporation, New York, who, as president of the American Iron and Steel Institute, brought to the conference the hearty support and indorsement of the iron and steel industry. "It will have the backing of everybody in the American Iron and Steel Institute," said Mr. Schwab, "as far as we are able to persuade them to carry it out, and I believe we will be. I hope the association that you have here outlined will reach such a development of perfection that we may use it as a model and adopt it for the whole iron and steel industry, because I believe in it and it is right."

Criticizing the weakness of the industry in the distribution of its products, Mr. Schwab said: "The whole talent has been devoted to seeing what we can do to reduce cost. Why didn't we give and why don't we give equal talent, equal energy and cooperation to devise a method of economically distributing our product? If the executives of the steel industry can't devise better ways of legally distributing their product, I am in favor of giving some of the men in the ranks a chance to see what they can do. Let those who built up the works see what they can do in the distribution of products. You know the distribution question is a difficult one. If it weren't, the best talent in the country would not be sought after to do it. The engineer and the works manager have done their jobs in the last 25 or 30 years. But those at the head, the executives in the selling and distribution departments, have their jobs ahead of them."

Opposes Preferential Prices

Discussing prices, Mr. Schwab stated that he was not in sympathy with the plan by which preferential customers by reason of their volume of business are regarded as entitled to better prices. "It is the little fellow," he continued, "that is entitled to better prices if anyone is, because the large buyer has chances which the small one has not. Let us have the same price for your product for everybody. I find that the great majority of our customers are happiest if they know they are paying the same prices as any competitors for steel. They don't want a better price and don't care whether it is $2 or $5 a ton. They

(*Concluded on page* 62)

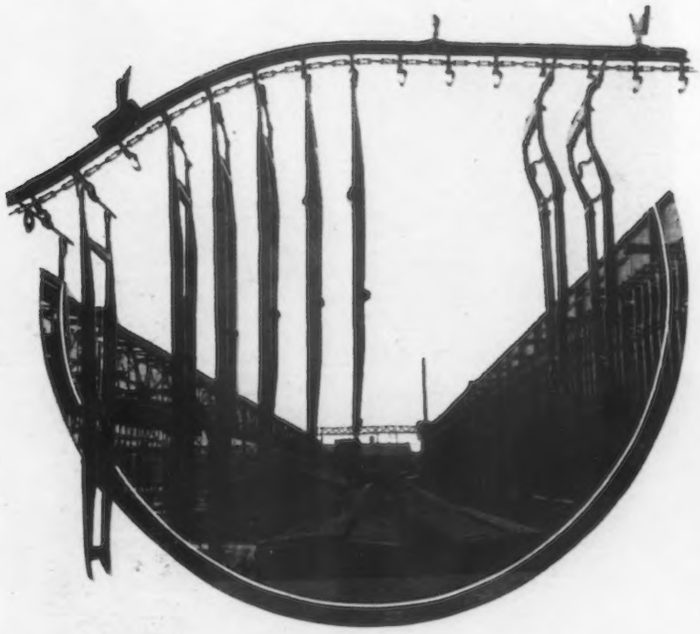
Chairmen of Jobbers' Committees Cooperating in National Distribution Conference

From those listed below the Messrs. Welton, Hansen, Sargent, Smith, Riddle, Puchta, French, Peden, Helm, Waterman, Morris and H. L. Gray, Simmons Hardware Co., St. Louis, and H. W. Caldwell, Hibbard, Spencer & Bartlett, Chicago, were named as a committee to meet with the committee of manufacturers' chairmen to confer on distribution problems

1. BOSTON, R. H. Welton, Chase, Parker & Co., Boston.
2. NEW YORK, W. E. Hansen, Hansen & Yorke, New York.
3. SYRACUSE, N. Y., A. B. Paull, Beals, McCarthy & Rodgers, Buffalo.
4. ALLENTOWN, PA., W. E. Bittenbender, Bittenbender Co., Scranton, Pa.
5. PHILADELPHIA, Fitzwilliam Sargent, Standard Supply & Equipment Co., Philadelphia.
6. BALTIMORE, Louis Moller, Anderson & Ireland, Baltimore.
7. RICHMOND, VA., Alvin M. Smith, Smith-Courtney Co., Richmond.
8. CHARLOTTE, N. C., Charles Nuchols, American Hardware & Equipment Co., Charlotte.
9. ATLANTA, George Winship, Fulton Supply Co., Atlanta.
10. JACKSONVILLE, FLA., L. J. Larzelere, Farquhar Machinery Co., Jacksonville.
11. PITTSBURGH, W. L. Rodgers, Pittsburgh Gage & Supply Co., Pittsburgh.
12. CLEVELAND, H. H. Riddle, George Worthington Co., Cleveland.
13. DETROIT, W. H. Basse, Joseph T. Ryerson & Son, Inc., Detroit.
14. INDIANAPOLIS, F. T. Holliday, W. J. Holliday & Co., Indianapolis.
15. CINCINNATI, George Puchta, Queen City Supply Co., Cincinnati.
16. NASHVILLE, TENN., Brown Buford, Buford Brothers, Nashville.
17. BIRMINGHAM, W. W. French, Moore-Handley Hardware Co., Birmingham.
18. MEMPHIS, TENN., James Pidgeon, Pidgeon-Thomas Iron Co., Memphis.
19. ST. LOUIS, George K. Conant, Sligo Iron Store, St. Louis.
20. CHICAGO, A. M. Mueller, Joseph T. Ryerson & Son, Inc., Chicago.
21. MILWAUKEE, I. R. Shadbolt, Shadbolt & Boyd Iron Co., Milwaukee.
22. ST. PAUL, MINNEAPOLIS and DULUTH, William J. Dean, Nicols, Dean & Gregg, St. Paul.
23. DES MOINES, IOWA, W. E. Muir, Luthe Hardware Co., Des Moines.
24. KANSAS CITY, Edward O. Faeth, Stowe Supply Co., Kansas City.
25. TULSA, OKLA., S. E. Clarkson, Oklahoma City Hardware Co., Oklahoma City, Okla.
26. DALLAS, TEX., Alfred Weaver, Briggs-Weaver Machine Co., Dallas.
27. HOUSTON, TEX., D. D. Peden, Peden Iron & Steel Co., Houston.
28. NEW ORLEANS, J. B. Simmons, Woodward-Wight Co., New Orleans.
29. PHOENIX, ARIZ., P. R. Helm, Pratt-Gilbert Hardware Co., Phoenix.
30. DENVER, H. V. Waterman, Hendrie & Bolthoff Machine & Supply Co., Denver.
31. SALT LAKE CITY, H. P. Lambrecht, Salt Lake Hardware Co., Salt Lake City.
32. SEATTLE, George W. Boole, A. M. Castle Co., Seattle.
33. SAN FRANCISCO, Henry Morris, 218 Chronicle Building, San Francisco.
34. LOS ANGELES, J. E. Webster, Ducommun Corporation, Los Angeles.

Flexibility in Making Automobile Frames

Cleveland Plant Can Quickly Change from One Run of Frames to Another



Has Progressive Assembly with Monorail and Automatic Conveyors

THE Midland Steel Products Co. has just finished the complete rearrangement of the automobile frame department of its Cleveland plant. New semi-automatic assembly lines, with conveying equipment for handling work on monorail tracks, and a new automatic unit for cleaning, painting and baking, with automatic conveyors for delivering the finished frames to the car loading platforms, have resulted in marked improvement in the quality of product, it is said, as well as reductions in production costs and a saving of one-third of the floor space previously required.

Special consideration was given to the flexibility required by the ever changing conditions in the automotive industry, and equipment has been installed and lines arranged so that, though called upon today to turn out one automobile manufacturer's frame by the thousands, they may, with equal efficiency, turn out another manufacturer's frame by the hundreds tomorrow, the delay in adjustment being only a matter of a couple of hours.

The general plan used in the progressive assembly lines of the automobile plants has been followed. Everything has been laid out to eliminate useless handling and to make for continuous, progressive operations. Parts are kept moving through successive operations until they reach the point in the assembly line where they are needed to be brought together to form a finished frame. The old method of grouping presses and other equipment according to their types and sizes, with the accompanying handling back and forth, has been eliminated. Equipment is now grouped for a progressive movement of the parts as required by their design, all operations being in sequence and with all handling and movements reduced to the minimum.

Work May Be Shifted from One Frame Line to Another

At the present time the Cleveland plant has three frame lines, two devoted to the manufacturing of a completely assembled frame and the third for the making of complete sets of frame parts, which are shipped unassembled to automotive manufacturers. Each unit is sufficiently flexible to permit the shifting of the jobs from one to another with little expense and delay, thereby insuring a rapid inventory turnover of automobile frames and eliminating large storage banks with their accompanying handling expense.

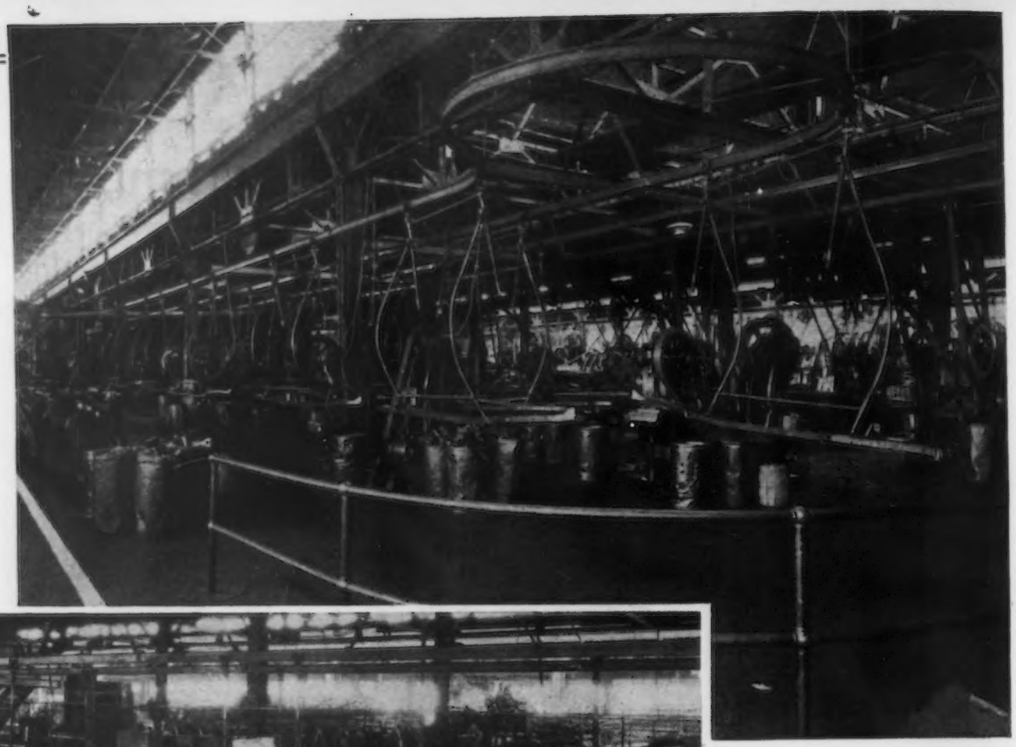
Great attention has been paid to a quick turnover of inventory. Steel is generally delivered directly from the freight cars to the pickling department and is on its way through into a finished frame, without delays or many handlings in the plant. The materials used are plates, sheets or hot-rolled strip—whichever is the most economical with a given design.

In pickling, all steel is handled in and out of the tanks in acid-resisting crates holding approximately 7 tons each. The crates are so arranged that each sheet is properly separated to insure complete action of the acid on the entire surface of the steel. After the acid immersion, the steel is rinsed in tanks of water and soda ash. In the final operation, before the steel is removed from the pickle crates, it is dipped in a tank of soluble oil. As the sheets are well separated for pickling, they receive a good coat of oil on both sides, eliminating the labor of lubrication with drawing compounds except in cases of difficult draws. From the pickle house the steel is delivered to the blanking presses in one of the frame lines.

Minimum of Manual Handling in Progressive Assembly

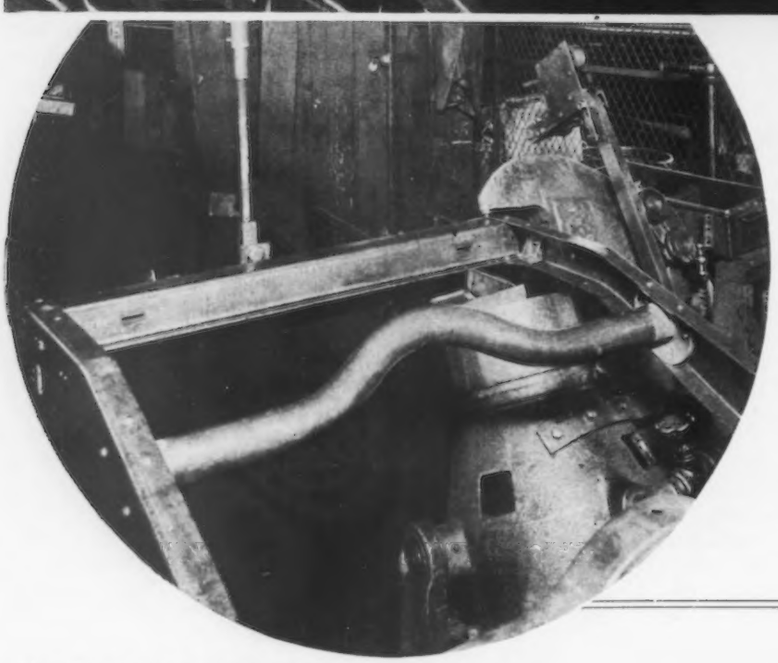
Each of the three lines is equipped with two mechanical presses for making side rails. In the first press, side rails are blanked and pierced in pairs in one operation, all holes being put in that will not distort during the forming operation. An automatic conveyor in the center of the press carries the blanks to the forming press, where they are formed in pairs. A conveyor from this press carries the rails to racks at the head of the side-rail assembly units. There are two side-rail assembly units on each line, one for right and the other for left hand members.

The side rail is set on a cradle suspended from a carrier that moves on a monorail track approximately 250 ft. long. The cradle is spring-suspended, making it flexible for handling the work during riveting operations. Riveting presses are so arranged along the conveyor that as the side rail is pushed along in its cradle to the presses the various spring

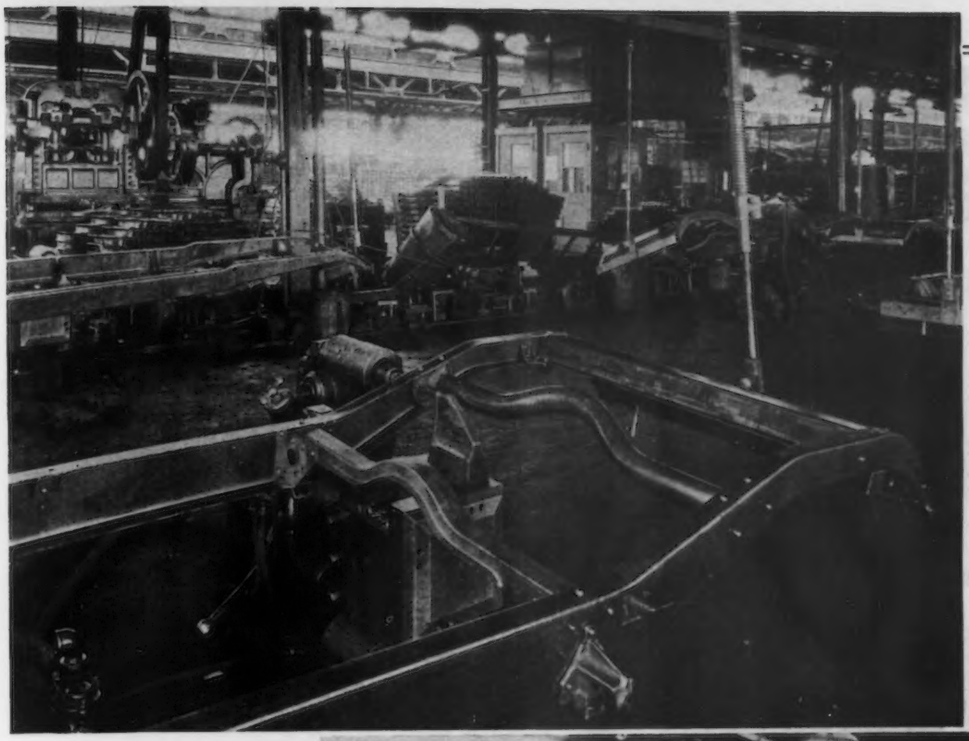


ONE of the Side Rail Assembly Lines. The rails, when formed, are hung on a cradle suspended from a monorail and are pushed along a line of presses that rivet on parts

THE Rails Pass from the Rail Assembly Line to the Rack in the Foreground, on Which the Frames Are "Nailed" Together with Rivets Driven in by Hand. Then the frames are suspended on the carrier in the background for the riveting operations

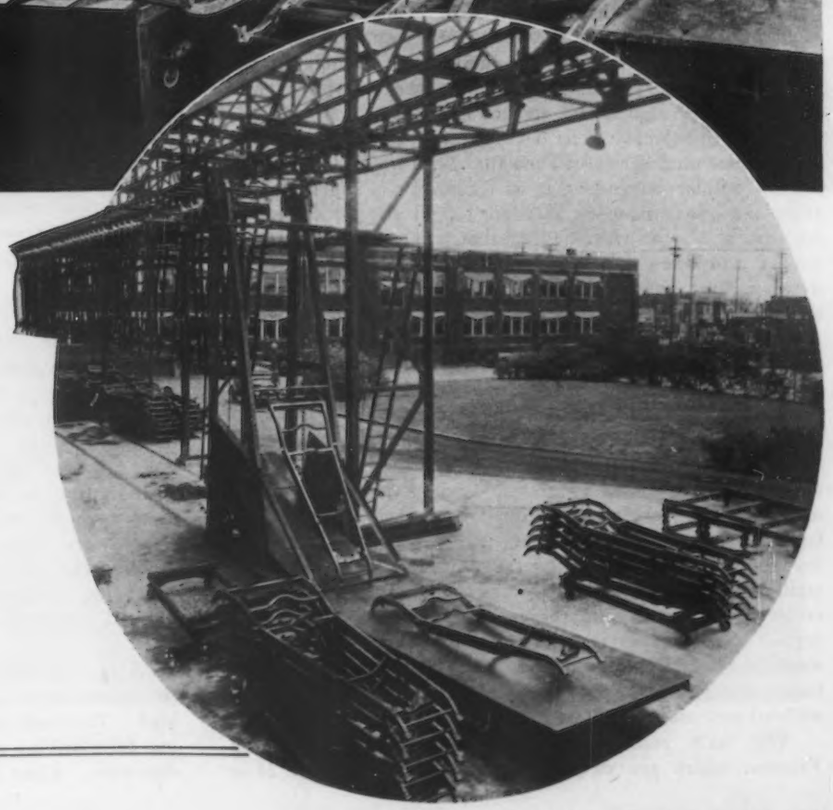


THE Bulldozer Riveting Machine for Driving Top and Bottom Flange Rivets Is Designed So That It Will Tilt to Meet Various Angles; Consequently the Die Head Can Be Placed at the Proper Angle to Assure a Perfect Riveting Condition. The holding fixture on the frame carrier is so designed that one man can easily turn the heaviest frame to any position required in riveting

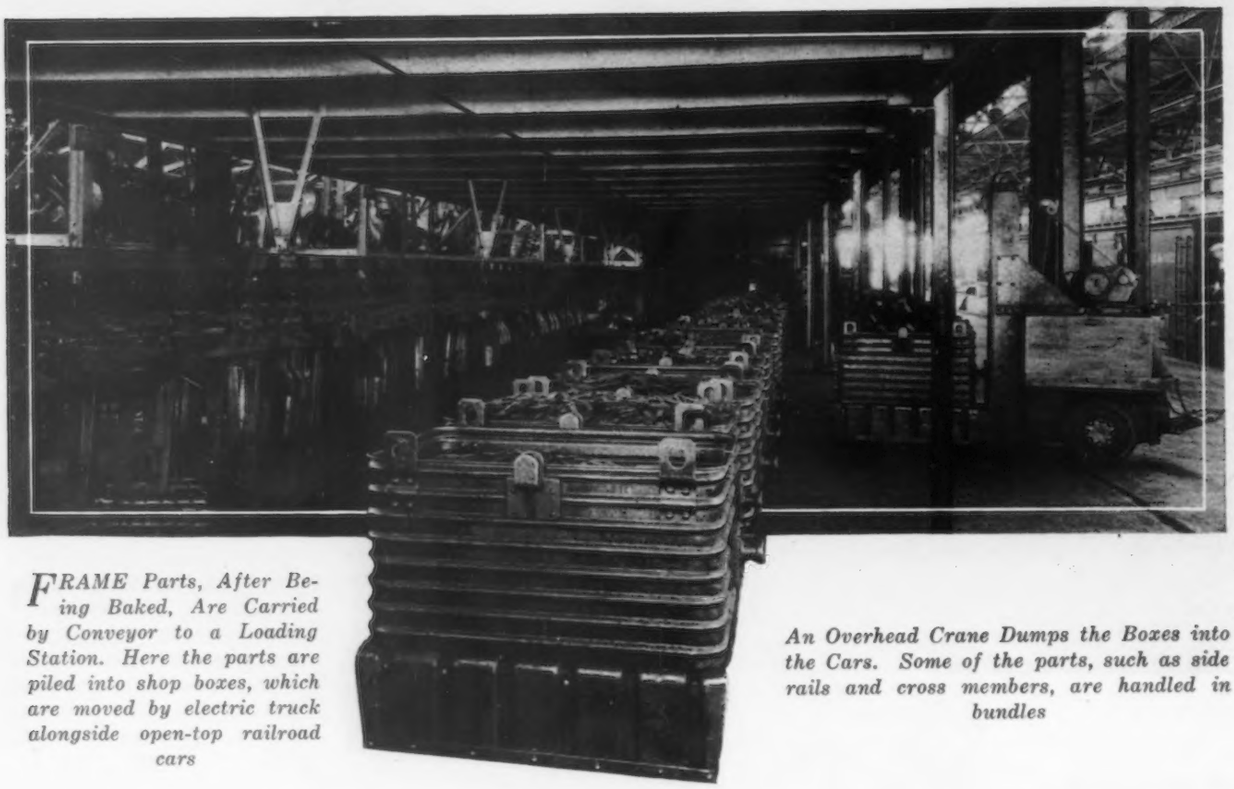


CLOSE - UP View of a Machine for Riveting Webs. Different types of anvils can be used with this machine, as may be required for different types of frames. Riveting is done cold with special heat-treated rivets

COMPLETED Frames on the Inspection Table. From here they are pushed to the entrance of the cleaning department at the right, where an automatic loading device picks them up and hangs them on an endless chain conveyor



ONE of Two Loading Docks, Showing a Section of the Endless Chain Frame Conveyor, and an Unloading Device that Automatically Detaches the Frames from the Conveyor Hooks and Deposits Them on the Table. Railroad cars for loading are spotted at the left. The conveyor, which is 2400 ft. long, is used to carry the frames through the cleaning and painting chambers and the baking oven, and out to the loading docks



FRAME Parts, After Being Baked, Are Carried by Conveyor to a Loading Station. Here the parts are piled into shop boxes, which are moved by electric truck alongside open-top railroad cars

An Overhead Crane Dumps the Boxes into the Cars. Some of the parts, such as side rails and cross members, are handled in bundles

hangers, motor supports, brackets, etc., are riveted to the rail without removing it from the cradle. On completing this circuit the side rails, with all attachments riveted on, are placed on progressive assembly stands, where the frame is literally nailed together with special rivets in a temporary assembly preparatory to permanent riveting.

Spring Carrier Handles Frame During Riveting Operations

The completely assembled frame, nailed together, is then suspended on a spring carrier so designed that the frame can be quickly attached or detached. The holding fixture is arranged so that the heaviest frame can be turned, rotated or put in any position required for riveting. It is a simple task for one man to handle the heaviest frame. All riveting is done cold, special heat-treated rivets being used for this work. The riveting in the main assembly line is done on a series of specially designed Hanna riveters of the bulldozer type of 20-ton capacity. The design of these machines makes it possible to get in various angles, corners and radii formed by the frame design, making proper allowance for standard mill variations in steel, and drive a rivet which will stand any tests that it may be expected to undergo.

The completely riveted frame, on reaching the end of the conveyor, is delivered to continuous inspection stands, where it is checked for accuracy of dimensions. It is then delivered to a platform for loading into an enamel unit. A special carrier made of steel tubing is quickly attached to the frame, using the spring hanger holes. The frame is then picked up by an automatic loading device, consisting of two endless chains carrying dogs on which the carrier tube rests, and is lifted to a vertical position. When it has reached the proper point, a hook on the main automatic endless chain conveyor grabs the tube carrier between a collar at its center and the frame is automatically transferred to the main conveyor for movement through the washing, enameling and drying unit. The movements of the loader and main conveyor are synchronized and are effected without any man power.

The main conveyor is approximately 2400 ft. long. Frames, which are suspended on this conveyor on 24-in. centers, pass consecutively through cleaning, rinsing, drying and painting compartments on the first floor up to a baking oven, approximately 650 ft. long, located on the roof of the plant. In the cleaning chamber the frames are washed with hot water containing a cleaning solution, delivered under pressure from above, with live steam discharged through nozzles at the side. In the rinsing compartment hot water flows over the frames, after which they pass into a drying chamber. They then enter the painting chamber, where a special lacquer-resisting primer is applied automatically. From here they move up to the oven, where they are given a 1-hr. drying in a temperature of approximately 400 deg. Fahr. The materials used, the time of drying and the temperature are calculated to deliver a high-class, long-lived weather-resisting finish.

Passing from the oven, the conveyor makes a horseshoe circuit at the side of the plant over two docks, between which are two spur tracks. This makes it possible to load from either dock, unloading machines being so arranged that selected frames can be removed on one side of the loop with the remainder passing around to the opposite dock.

Automatic Unloading Machines on Each Dock

Automatic unloading machines are provided on each dock. The unloading machines are similar to the loading machines except that the operation is reversed. They are mounted on tracks so that they can be placed opposite the door of the car into which the frames are to be loaded. The unloader is completely automatic and detaches the frame from the main conveyor, allowing it to slide slowly down to a flat table, where the conveyor tube is removed. Frames are stacked on trucks, on which they are run into the box car for loading. The outstanding feature of this conveying equipment is that the entire unit will handle any and all types of frames as they come off the production lines.

A highly efficient production line has been installed for the manufacture of frame parts that are shipped unassembled. This unit starts out with two mechanical presses, one for blanking and piercing and the other for forming the side rails. After they come off the forming press, they are

delivered directly to a continuous rail assembly line, at the end of which they are hung on an endless chain conveyor which carries them automatically through washing, rinsing and drying chambers and then loops downward through a dip painting tank. Moving upward slightly, this conveyor takes the side rails through a baking oven, which is located 10 ft. above the floor, so that working space is available underneath.

The cross members and other small parts are fabricated on specially arranged lines of presses along the side of the baking oven, and a separate conveyor is provided to handle these parts. Each part passes from the blanking, forming and sub-assembly operations in a continuous movement without delays in handling. The workman on the final operation hangs the part directly on a hook of the conveyor, which passes at his side. This conveyor carries the parts along the side of the oven, makes a 180-deg. turn and goes through the same cleaning, rinsing, drying, painting and baking unit that is used for the side rails. The smaller conveyor emerges from the oven near the point at which it was loaded when moving in the opposite direction, and then passes under the oven for unloading.

Some Frame Parts Bundled, Others Shipped Loose

Various parts are removed at predetermined stations. Side rails, cross members and all parts which can be are put in standard bundles. The other small parts are dumped into shop boxes. The bundled parts are picked up with a crane and stacked into gondola cars, from which they are likewise unloaded at the automobile plants. The loose small parts are automatically dumped in partitioned gondola cars, from which they are removed with a magnet at the motor car assembly plants.

The frame parts unit has a capacity of over 2000 completed sets of frame parts in 9 hr. With an average of 46 parts to each frame going through this line, over 92,000 parts are formed from raw steel and are delivered, completely painted, to open-top cars in 9 hr.

In addition to this plant in Cleveland, the Midland Steel Products Co. also has a large plant in Detroit, which will be rearranged in a similar manner, following appropriations just authorized. Through its predecessor, the Parish & Bingham Co., the company has followed the development of transportation for a third of a century. It was first organized to do a general stamping business, making watch cases. It launched out into the transportation field of the day, by making hardware parts for horse-drawn vehicles, harness, etc. When the bicycle came into vogue the company was a large manufacturer of sprockets, and in 1903, which was the year the first pressed steel channels were developed, it went into the automotive field. The following year marked the company's first production of automobile frames.

The company, with its predecessor, claims to have produced a greater percentage of automobile frames manufactured in the United States than any other single unit. In the past 10 years it has manufactured 12,432,000 automobile frames, which is 44 per cent of the 28,000,000 automobiles manufactured in the United States during that period.

Factory Payrolls Influenced by Speculation

Factory payrolls move inversely with speculation in securities and with money rates, according to Alvan T. Simonds, president Simonds Saw & Steel Co., Fitchburg, Mass., in an article in the July 1 issue of *Looking Ahead.* Five charts, for the years 1919-1921, 1920-1923, 1921-1924, 1923-1925 and 1924-1928, show that factory payrolls increase following decreasing speculation and lowering money rates and that payrolls decrease following increasing speculation and increasing money rates.

"What is going to be the effect upon factory payrolls, upon the amount of manufacturing done in the United States during 1928 and 1929 and possibly 1930 and 1931, of this four years' upward spurt in speculation (1924-1928)? We make no prediction," says Mr. Simonds. "We do not even claim that bull markets will always be followed by decreasing factory payrolls. If this is always the case, it makes little or no difference whether the one that comes first is the cause of the other or not.

"When speculation turns down in the next bear market, it will mean, according to the charts, that some months later factory payrolls will begin to increase and continue to increase for as long as the bear market continues."

PARTS for Frames That Are Shipped Unassembled Are Made on This Row of Presses. They are then suspended on a conveyor directly back of the presses, which carries them through the cleaning departments and baking oven, one side of which is shown in the rear

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More Apprentices, Fewer Unemployed

Unskilled Workers Suffer Most in the Displacements Due to Machines, Yet the Skilled Are Scarce—One-Operation Men Are No Solution of the Problem

BY C. J. FREUND*

BUSINESS men have paid a great deal of attention in the past half year to the problem of unemployment. In fact, it may be said that they have given more thought of late to that subject than ever before, probably for the reason that the last half year has seen the most serious period of unemployment since industrial leaders learned to appreciate fully the detrimental effect of unemployment upon business conditions. Social workers and social agencies do not ordinarily influence business men directly to any great extent. However, in recent months sociologists have disturbed the American business mind with reports of many men out of work, and hence out of the market to a large extent and an additional burden upon the various communities.

Estimates of the number of persons unemployed in February varied greatly, ranging between one million and four million. Secretary Davis of the Department of Labor considered the number to be about 1,800,000. But the lack of exact figures did not shake the general conviction that unemployment was serious and many committees and commissions undertook a careful study of the question.

Labor-Displacing Influences Steadily at Work

The problem appears to be particularly pressing because economists have pointed out that unemployment is no longer the result of temporary depressions only, but has been brought about by the greater mechanization of manufacturing processes and is a permanent and growing condition which becomes more or less severe, but will not disappear altogether.

The constant invention and installation in manufacturing plants of machines and processes whereby one or two men can turn out more work in a day than a dozen men were able to do in a week ten years ago is bound to have its effect upon the lives of the people in our cities. In the oil industry, for instance, output has increased 85 per cent in the last four years while the number of employees in the industry has decreased 5 per cent in the same time. In the meat packing industry production has increased 20 per cent and employment has decreased 19 per cent since four years ago. Similar conditions obtain in most industries.

Many Material Handlers Lose Places

Unfortunately the unskilled worker suffers first in a period of less employment and suffers most. There is an element of tragedy in the fact that the man who has the smallest income is usually the first to be thrown out of work. Besides having the smallest and most uncertain income, the unskilled laborer, if married, is almost certain to have a larger family than his more fortunate fellow workers in the skilled trades and in clerical positions. However, it is but natural that the untrained man should be most affected in a period of unemployment. The unskilled laborer is the least intelligent of industrial workers, he is least prepared to adjust himself to a change of conditions in industry. Hence, in the fierce rough and tumble of competition following upon restricted activity in industry, he is the first to be crowded out.

Also, much of the invention of machinery in the last few years has been in the field of material handling, which is the proper field of the unskilled workingman. Formerly, when a car of coal was to be unloaded, a half dozen men were hired to shovel it over the sides and a half dozen more brought it in wheelbarrows to bins or piles where it was stored. Today, the car is lifted above the pile of coal and its bottom drops out, or the car is emptied by turning it upside down. It is not so long since truckers in machine shops brought work from one machine to another. These truckers have been very largely replaced by mechanical conveying systems. Everywhere the common laborer finds less and less demand for the strength which is all he can offer to industry. In 1922 there were 80 applicants for every 100 common labor jobs in the State of New York. Today, every hundred of such jobs attracts 400 applicants.

Yet Skilled Workers Are Scarce

On the other hand, manufacturers everywhere find it impossible to get sufficient skilled mechanics. On account of the laws restricting immigration it is no longer possible to import skilled men from Europe, and until the laws were passed American manufacturers did not realize the extent to which they were dependent upon European skill. In the past, American boys have shown no considerable tendency to go into trades because they have been taught, however indirect and unintentional the teaching may have been, that any kind of manual work, or any occupation involving manual work, was beneath the dignity of an American citizen of the finest type.

As a result, employment agents go out looking for mechanics, even though great numbers of men are waiting in their anterooms and still greater numbers in the public employment offices. Not long since a foundry employment manager was unable to find 20 molders, although thousands of men were said to be out of work in the city. He made efforts to import them from other centers but failed. Less than five months ago a prominent machinery manufacturer expanded his business and sought 65 high-class machinists. To this day he has not got those 65 machinists together, although there were, and may still be, many hundreds of men waiting at the various local public employment offices. Everywhere one hears the same story: great numbers of men who call themselves mechanics in various lines but very few who are really capable of doing first class work.

Unskilled Men Must Be Trained

This shortage of skilled mechanics when large numbers of unskilled men are out of work suggests the obvious wish that a portion of the unskilled men for whom there is no work were trained mechanics for whom there is a distinct demand. But this wish need not be a wish merely. It suggests the possibility of partial relief and solution of the

*Apprentice supervisor, Falk Corporation, Milwaukee.

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problem. Of course, it is impossible to transfer the best men in the unskilled class to the rank of mechanics as easily as marching them from one side of the street to the other. *Nevertheless, it can be done; it can be done by means of industrial training.*

Only the will of the manufacturer is necessary; the material is already there. Every superintendent and works manager knows that the unskilled men in his plant include a number who are energetic, ambitious and responsible, who have a natural gift for mechanical work but who have been denied by circumstances the opportunity to learn a trade. Men of this kind are anxious to improve themselves and if the employer will only provide facilities for learning, these men will soon promote themselves above the laboring class. Is there anything more ridiculous than the attitude of the employer who complains of the lack of skilled mechanics, wonders what to do when laborers are out of work because of material handling equipment which has been installed, admits freely that a number of his laborers have much natural ability, and does nothing about it? He would display much ingenuity in the solution of some problem in finance or production but the training of some of his laborers for better work never occurs to him.

Of course, industrial training will not completely solve the problem of unemployment nor can it be expected to influence the situation to any extent unless it becomes general throughout the country.

Also, since every modern undertaking must be well organized to be successful, apprenticeship suggests itself as the type of industrial training which will be most effective because apprenticeship is the most highly organized industrial training.

One-Operation Men Certainly Not the Answer

There is much more room for trained men in industry than most people realize. One sometimes hears it said that there is no place for the skilled mechanic in modern production industries. The very managers of automobile plants have been known to say that they want nothing except men who can be taught a mechanical operation and are willing to stay at it indefinitely.

But where do such managers find their superintendents, their foremen and inspectors? Who is there to show these same mechanical operators what to do and how they are to do it? Mechanics are necessary in production industries to take care of the maintenance of machinery and to set it up in the first place. Skilled men of the highest class are required to plan and to make the tools and fixtures which make production work possible. Only highly trained men can plan the routing of work, the placing of machines and the proper arrangement and correlation of various departments. Although every machine operator in production industry need not be a trained mechanic, still our production industries offer the skilled workman more opportunities than were ever dreamed of before quantity manufacture came into being.

Mass Production Industries Not All the Story

Besides that, who has said that all American manufacturing is going on a production basis? It will be a long time before locomotives, for instance, will be built by the thousands from one design and assembled and taken out of the shops on a moving production line. Neither is it likely that freight cars will be manufactured in this manner, although the building of locomotives and freight cars, and passenger cars, too, is an industry of no mean importance. The public utilities have grown tremendously in recent years. In a typical American city the consumption of electric power was 106,000,000 kw. hr. in 1916. The power consumption in 1926 was 610,452,000 kw. hr., an increase of nearly 500 per cent in ten years.

Undoubtedly there has been a similar development of electric service in every American city. In order to supply this increased demand for electric power, boilers and generators must be built together with auxiliary machinery of different kinds. Still, it is unlikely that high production methods will be applied to the manufacture of 60,000-kw. turbo-generators. Furnaces, cars, cranes and rolling machinery must be built for the gigantic steel industry; mining machinery, engines and boilers for ships; printing presses, paper-making machines, equipment for food industries and for chemical industries, machine tools for the use of the varied production industries which depend upon them. All these are branches of manufacturing which do not lend themselves to mass production and in which the trained mechanic is more essential and can find more opportunity than at any previous time in history.

More Trained Men Needed in Sales

Moreover, the manufacture of standardized equipment of different kinds in quantity has created a great demand for highly trained men to do sales and service work. Men are now needed in the field to point out to the customer how standardized machinery and equipment may be adapted to his needs where in years past the customer's engineers designed special machinery to do the work.

Also, the saying is still true that there is always room at the top. A capable superintendent is extremely rare. A first-class foreman is not easily found. In a manufacturing organization of 3000 men, how many could qualify for president? The high salaries paid to industrial executives, even when they are not heavy stockholders, frequently not stockholders at all, is the best evidence of the scarcity of real leadership in industry.

The entire industrial world beckons to the trained man. On all sides, in every department of manufacturing and commercial activity, everywhere there are positions waiting for the man who has a certain skill. Regardless of the number of intelligent and resourceful laboring men who might be given trade training, all could find work to do. Thousands of them would release more experienced mechanics for positions of greater importance and responsibility. The surplus of unskilled men could be reduced indefinitely by transfer to the skilled class without building up a surplus of mechanics, without even satisfying the demand.

Apprenticeship Is Eminently the Solution

Apprenticeship will be particularly effective in relieving the pressure of unemployment among the unskilled because it reaches directly into the heart of the problem. Apprenticeship is the particular course of industrial training whereby the unskilled man becomes skilled, hence apprenticeship will accomplish the transfer of men from the unskilled to the skilled more readily and more efficiently than any other method of education.

Modern apprenticeship will attract large numbers. Fortunately American young men have learned to be suspicious of the old-fashioned, haphazard training programs which were largely promises and exploitation. Experience has shown that when real apprentice training is provided with a contract arrangement, proper supervision, well-thought schedules of work and pay, school work, and careful shop instruction, it is not difficult to attract sufficient boys and young men. In fact, the well established corporations which have been training apprentices for a number of years all have a waiting list for every trade.

Apprenticeship is an institution which produces results, not only for the present but more particularly for the future. The young men who are saved from swelling the unskilled labor class remain good mechanics for years to come and do their share in the training of other young men of a new generation. Again, apprenticeship affects exactly the right type of boys and young men. Regular trade apprentices ordinarily are boys who have not been able to complete their education. The very fact that they become apprentices marks them as being capable and energetic beyond the average, and the type of young men who should be transferred from the unskilled class to the skilled.

Business Analysis and Forecast

Expects Better Business by Fall

Recession Meanwhile of Greater Than Seasonal Proportions —Renewed Boom Not Looked For

BY DR. LEWIS H. HANEY
DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

CONDITIONS unfavorable to business expansion appear to be predominant and to indicate a period of moderate liquidation and recession during the early summer months. The recession is likely to be of greater than seasonal proportions. Higher money rates and political uncertainties are tending to restrict buying, and the sagging trend of commodity prices —partly a result of the foregoing—reacts to the same effect. Needless to say, however, deflation in the stock market no more forecasts a sharp recession in business than the inflation of last year forecast expansion.

AT present the chief interest centers in finance. The outstanding development in June was the reversal of the stock market's inflationary trend. The large gold supply and accumulation of funds in the hands of corporations, together with the Reserve Bank policy of last year, has led to tremendous inflation in stocks, and the more recent gold exports together with the change in reserve policy finally checked this inflation and brought about a very sharp reaction. Money had come to cost about 6.28 per cent, bonds to yield about 4.4 per cent, and common stocks, after rising to a point where the yield was only 3.95 per cent, even at this writing yield but 4.33 per cent. The return on invested capital and the yield on securities were much lower than interest rates, even commercial paper rates being higher than the yield on bonds and stocks. The readjustment was bound to come.

Probably this adjustment is not yet complete. Brokers' loans are still abnormally high (we estimate that they should be reduced to about $3,100,000,000 to be normal), and there is no reason to believe that the Reserve Banks are satisfied. Security yields continue much below interest rates. Under the circumstances, further liquidation is to be expected. But the time will come when, as speculative requirements are reduced and high money rates tend to attract funds from abroad, while yields on securities increase, forces making for easier money will gain the ascendency and equilibrium will be restored.

Nothing in prospect for industrial earnings now seems

Factors in the General Business Outlook

Favorable

1. ***Increase in building contracts and permits, and a large volume of structural steel bookings in May***
2. ***Recovery of retail and wholesale trade in May***
3. ***Farm purchasing power improved***
4. ***Large automobile production***
5. ***Increased merchandise exports in May***
6. ***Considerable liquidation in securities without any severe financial disturbance***
7. ***Strong financial position of leading companies***
8. ***Light mercantile inventories***

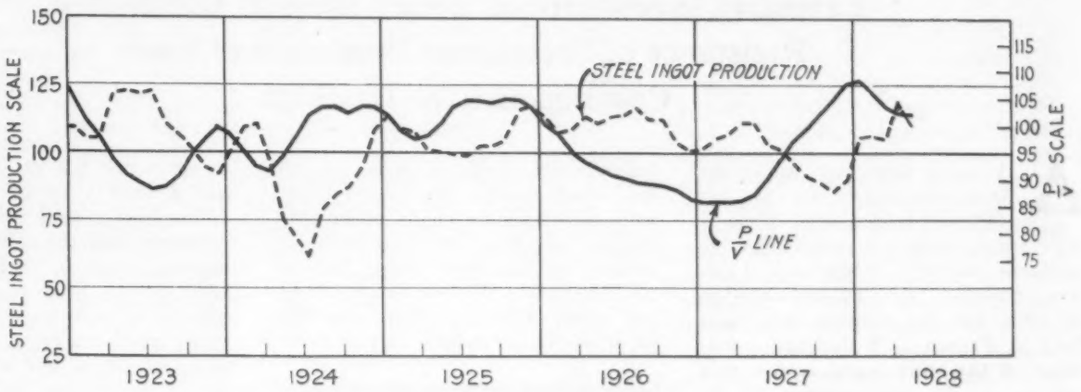
Unfavorable

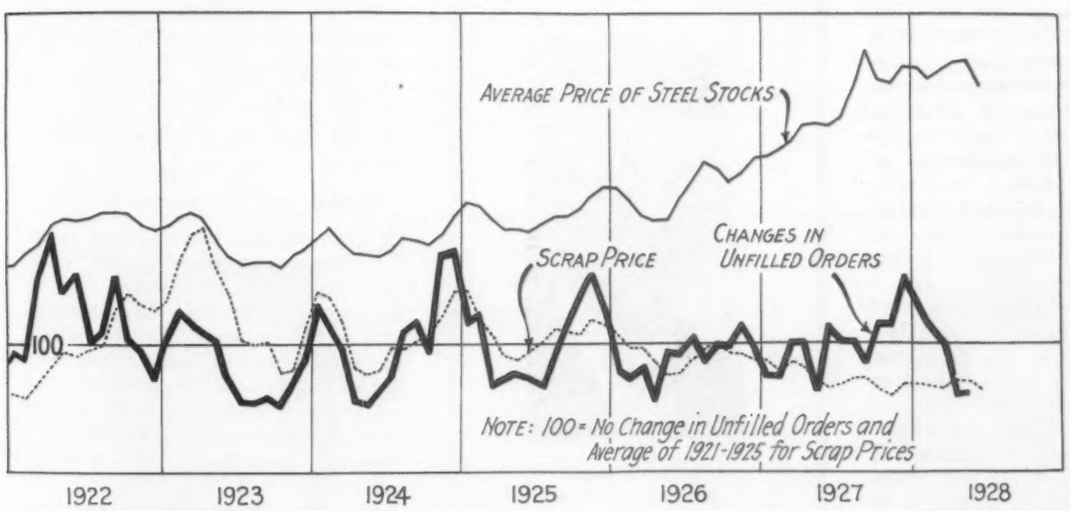
1. ***A further decline in the P-V Line***
2. ***Declining commodity prices***
3. ***Declining unfilled orders for steel and other basic commodities***
4. ***Severe competition and narrow profits***
5. ***Increased business failures***
6. ***Unfavorable conditions,*** *with increases in physical inventories, in a number of industries (e.g., textiles, shoes, tires, lard, zinc, paper, sugar, bituminous coal, and some branches of iron and steel)*
7. ***Money rather tight,*** *due to large gold exports and brokers' loans and accumulation of bonds on dealers' shelves*
8. ***The severe setback in the stock market***
9. ***Continued unseasonable weather***
10. ***Political uncertainties***

to give reason for expecting a renewed boom in business, nor is there any reason to expect that any considerable proportion of the gold that we have shipped abroad will return. It does seem, however, that by fall the readjustment will be fairly well along and that, with easier money, a sounder valuation of securities, and greater political certainty, the constructive forces may take the lead.

Commodity prices, except in cases of threatened crop shortage, are for the most part sagging. Certainly curtailment is desirable in a number of industries, as stocks of goods are accumulating, notably in the case of zinc, cotton and silk textiles, shoes, leather, and lard. Even in the case of copper, production has recently been gaining on shipments. The decline in the P-V Line is moderate and

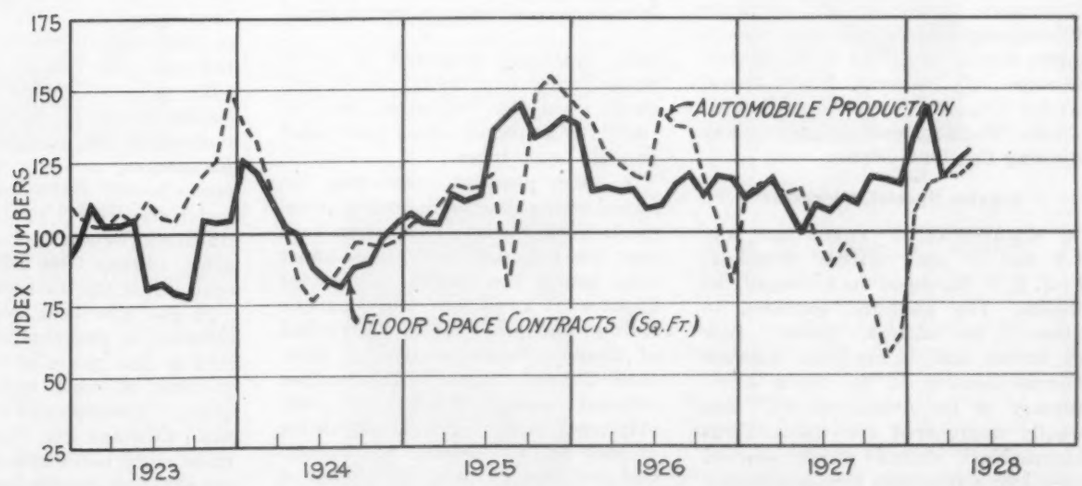
DOWNWARD Movement of the P-V Line (Ratio of Commodity Prices to Physical Volume of Trade) Appears to be Rounding Off for a Rise. Steel production (adjusted) after rising for five months has turned downward again





UNFILLED Orders Have Declined Further; Stock Prices, Though at a High Level, Are Irregular and Scrap Prices Are Weak. All three indexes point to lower operating conditions

BOTH Building Activity and Automobile Output Showed an Advance in May. They are higher than at the same season in any of the past five years



The P-V Line (a ratio between commodity prices and the physical volume of trade) continued its moderate downward trend in May and, along with other unfavorable indications and the prevalence of uncertainty in several important respects, this trend forecasts a period of moderate recession in general business. As in recent months, this barometer continues to indicate that the activity of industry is somewhat in excess of the demand for industrial products at current prices.

gradual, however, showing no serious maladjustments, though it indicates that demand is relatively weak in comparison with supplies.

The May decline in the adjusted curve of steel ingot production is in accord with the forecast given by the P-V Line early this year, and reflects the decline in unfilled steel orders that began in April. Apparently the influence

(Concluded on page 62)

Metal Studies by Testing Society

Extensive Investigations Under Way on Corrosion-Resistance of Sheets, and Properties of Steel Castings and Die Castings

AT Atlantic City last week, the American Society for Testing Materials held a series of meetings which broke all records for attendance. Growth of this society has been constant since its organization in 1898, but the meeting last year, held at French Lick Springs, somewhat off the main travel routes, was not up to its predecessors. Up to Wednesday evening of last week 808 members had registered (already a record); counting the later arrivals of those who attended discussions on non-metallic materials on Thursday and Friday, the total doubtless approached 1000. Total membership of the society, as of June 1, was 4193. The volume of the society's publication for the last calendar year also sets a record at 3975 pages. Newly elected officers are:

President: G. W. Thompson, chief chemist National Lead Co., Brooklyn.

Vice-President: K. G. Mackenzie, consulting chemist, Texas Co., New York.

Members of Executive Committee: T. R. Lawson, head, department of civil engineering, Rensselaer Polytechnic Institute, Troy, N. Y.; H. S. Mattimore, engineer of materials Pennsylvania State Highway Department, Harrisburg, Pa.; P. D. Merica, director of research International Nickel Co., New York, and Samuel Tobias Wagner, consulting engineer Reading Co., Philadelphia.

Notable Special Addresses

A GRATIFYING innovation was due to the retiring president, Prof. H. F. Moore of the University of Illinois. The audience, gathered to listen to his address, "Hooke's Law of Stress and Strain — an Address Commemorative of the 250th Anniversary of Its Announcement," was wholly unprepared for the brilliant biographical sketch which reached back into a forgotten time and revivified the dour experimenter and inventor, and his contemporaries, Robert Boyle, Isaac Newton and other founders of the Royal Society.

Dr. Frank B. Jewett, in the Edgar Marburg lecture, also departed from the custom of discussing some phase of materials testing. He described in broad outlines the 15-year research which preceded the establishment of transoceanic telephony. A moving picture then showed the special apparatus and personnel required to complete a call from America to Great Britain by means of long distance land lines and a wireless stretch across the north Atlantic. Such powerful sending stations require vacuum tubes with capacities measured in horsepower rather than watts; the lecturer dwelt upon the refinement and research in materials which have made possible such tubes.

H. F. MOORE
Retiring President

A third pleasant event was the award of the Charles B. Dudley medal to A. V. de Forest. It is given each year for the most meritorious paper read before the society. His paper appeared in a symposium on magnetic testing, and was entitled "A Method of Graphic Representation of Magnetic Characteristics." It described automatic equipment which will probably result in a more rapid adaptation of such testing methods to commercial problems. A brief description of Mr. de Forest's method was printed on page 1459 of THE IRON AGE for May 19, 1927.

Researches on Metals and Alloys

A PRONOUNCED change in the activities of the American Society for Testing Materials, especially in so far as metals are concerned, is apparent. During the early years of its existence the various committees had a busy time to harmonize the differences between the desires of the producers and the consumers of tonnage commodities. Satisfactory agreement having been reached on trade customs, it then became evident that many questions remained of a more technical nature, and about which little or no precise information was available. Consequently the active committees at present are those which are engaged in some research to clear up questions of fact. No less than 26 of such projects are now under way, in the field of metallic materials alone.

Sulphur and Phosphorus in Steel

AS an instance, a committee to investigate the effect of phosphorus and sulphur in steel was organized in 1919, under the chairmanship of Dr. George K. Burgess, director Bureau of Standards. This committee has enjoyed the cooperation of many organizations and firms and has been able to report as the result of a thorough investigation that residual sulphur up to 0.077 per cent is not detrimental to steel plate (see THE IRON AGE, July 3, 1924, page 55) nor to rivet steel in quantities up to 0.06 per cent (see THE IRON AGE, July 1, 1926, page 5). In order to make a similar study of steel for forging, containing less than 0.02 per cent phosphorus, a series of eight basic open-hearth heats has been made under observation by Jones & Laughlin Steel Corporation, ranging in residual sulphur from 0.031 to 0.116 per cent, rolled and distributed for test.

It has also been decided that the influence of phosphorus on steel castings is that phase of the phosphorus problem of most immediate importance. Consequently the Atlantic Steel Castings Co., Chester, Pa., has made eight heats in a 10-ton stationary acid open-hearth furnace. Series A with low carbon has phosphorus ranging from 0.025 to 0.10; while phosphorus in the higher carbon castings in Series B does not go so high. Funds for the work were raised by the American Foundrymen's Association and the Steel Founders' Society of America. Test bars were made in open molds of dried sand, six bars 1⅛ in. square by 12 in. long being cast

on the bottom of a large block. The test bars are then cut off, cleaned and equal portions of Series A were given the following heat treatments before testing:

Annealed bars: Heated to 1650 deg. Fahr., held 2 hr., cooled in furnace (1600 deg. Fahr. for Series B).

Normalized bars: As above, but removed from furnace and cooled individually in still air.

Normalized and drawn: After normalizing, reheated to 1150 deg. Fahr., held 3½ hr., cooled in furnace (1250 deg. Fahr. for Series B).

In cooperation with the American Petroleum Institute, a program is being formulated to study the effect of added phosphorus on the weldability of pipe steel, and on the properties of pipe made therefrom. These tests will cover the range of carbon 0.06 to 0.12 and phosphorus 0.025 to 0.10.

Corrosion of Metal

ANOTHER research committee, headed by J. H. Gibboney, Norfolk & Western Railway Co., placed various kinds of sheet steel on outdoor racks some 12 years ago, and has been observing the condition periodically since. Failure in smoky atmosphere was rapid. The rack in the clear air of Fort Sheridan, Ill., has been dismantled, since it is apparent that the sheets are failing in substantially the same order as at Pittsburgh, namely, copper-free materials first; copper-bearing iron and steel later. Failures at Fort Sheridan in the non-copper-bearing groups have occurred after 37 months' exposure; copper-bearing sheets started to fail only after 130 months.

Tests on similar sheets submerged in fresh water, brackish water and mine water show that corrosion resistance of submerged iron and steel sheets is practically uninfluenced by copper content.

These exposure tests have attracted such wide approval that two years ago an inclusive series of steel sheets having commercial zinc coatings (hot galvanized sheets) were exposed at five different localities. It is too early to observe anything but the early stages of corrosion, but in time this test will answer many questions regarding the mutual effect of thickness and composition of the coating and of the underlying metal. Several thousand samples of coated wire, fencing, conduit, pipe, bolts, hardware and structural shapes are now being collected and will be placed on test racks this autumn. Several railroads and highway departments are cooperating in a plan for similar investigations of flexible metal culverts.

Corrosion of non-ferrous metals is also to be studied. A comprehensive plan has been outlined by a committee under T. S. Fuller, General Electric Co., and $4,250 subscribed toward the necessary expenses. Twenty commonly used alloys will be exposed in sea water, in "mother liquor" from a salt works, in caustic soda solutions from chemical and paper factories, in hydrochloric and sulphuric pickling solutions. Galvanic and electrolytic effects will also be studied by exposing standardized couples of various metals to atmospheric corrosion, and to various solutions as noted above.

Properties of Structural Steel

A research committee on the yield point of structural steel, in which the Association of American Steel Manufacturers, the American Railway Engineering Association, the American

F. B. JEWETT
Marburg Lecturer

FRANK B. JEWETT, *vice-president of American Telephone & Telegraph Co., and head of the Bell Telephone Laboratories, delivered the third Edgar Marburg Lecture. He graduated in* 1898, *taught electricity and physics at Massachusetts Institute of Technology, and joined the engineering department of the Telephone Co. in* 1904. *From* 1912 *to* 1925 *he was assistant chief engineer, chief engineer and vice-president of Western Electric Co. He has received many honors from learned institutions and national governments.*

G. W. THOMPSON, *the new president of the society, is a director of National Lead Co., and its chief chemist since* 1892. *He has also been president of the American Institute of Chemical Engineers* (1918). In 1927 *Armour Institute of Technology conferred on him the degree of Doctor of Science. His principal interests in the American Society for Testing Materials has been in preservative coatings for structural materials and in the general methods of testing.*

G. W. THOMPSON
The New President

A. V. DE FOREST
Dudley Medallist

A. V. DE FOREST *is research engineer for the American Chain Co., Inc., Bridgeport, Conn., having held that post since* 1918. *Mr. de Forest is a graduate naval architect from Massachusetts Institute of Technology* (1912) *and did post graduate work in metallography at Princeton and Columbia Universities. Prior to joining the Laboratory of the American Chain Co., he was for two years in the research department of the Remington Arms Union Metallic Cartridge Co. He is well known among the members of the Steel Treating society.*

New Members, Executive Committee, American Society for Testing Materials

H. S. MATTIMORE

P. D. MERICA

S. T. WAGNER

Society of Civil Engineers and the American Institute of Steel Construction are cooperating, reported through its chairman, M. O. Withey, professor of mechanics, University of Wisconsin.

Six hundred specimens were made by the Illinois Steel Co., cut from three grades of round steel bars, selected from very uniform heats of ordinary bridge steel and nickel and silicon structural steel. Five laboratories then determined the influence of the speed of testing. Stress at the yield point was determined by four methods, viz., drop of beam, scaling of specimen, use of multiplying dividers to note 0.5 per cent strain, and acceleration of a sensitive strain gage.

All steels showed a consistent increase in yield point as the speed of pulling increased. For instance, silicon structural steel bars have a yield point of 49,500 lb. per sq. in. when pulled at the rate of 0.05 in. per min., but show a yield 6500 lb. higher when pulled at 2 in. per min. The corresponding difference for carbon steel is 3900 lb. and for nickel structural steel 4800 lb. In discussing this point, L. B. Tuckerman of the Bureau of Standards said that the scatter between results of different laboratories and different methods of test would be even less at lower testing speeds. H. E. Smith, engineer of materials New York Central Lines, emphasized the practical point that the greatest discrepancies in rapid testing come from overrunning the counterpoise in an attempt to keep it balanced against the increasing load; thus a fictitiously high yield point is shown at the drop of the beam.

Professor Withey's committee also tested a large number of pieces taken from mill run structural shapes and plates. The above results of rapid loading were noted, somewhat more intensified. He believes that the indications of the proportional divider are the most positive; scaling occurs at about 5 per cent above the yield point determined by dividers. It is also noted that shapes ⅜ in. thick have a yield point 11 to 19 per cent higher than those with flanges or web ⅜ in. thick, when the samples are cut from corresponding places on the cross-section. In such testing, large differences may be expected if samples are taken at random, on account of the influence of ingot segregation at the top and of various amounts of working during rolling on different portions of the cross-section.

K. G. MACKENZIE
Vice-president, American Society for Testing Materials

This latter point was emphasized in a second paper by Professor Withey, entitled "Tests of Specimens Cut from Different Portions of Structural Steel Shapes." Nearly 400 tests were cut from carbon steel H-beams, channels, angles and plates, such as are fabricated into columns. The table shows the average results, where "highest average stress" represents the weighted average for a single cross-section, figured from the various test pieces taken therefrom. Considerable variation occurred in the 10-in., 20-lb. channels; mean values are as follows:

Tension	Toe	Root
Ultimate strength (lb.)	54,500	52,500
Elongation in 8 in. (per cent)	19.1	28.6
Yield point (lb.)	33,900	31,400
Proportional limit (lb.)	28,400	27,300

Such differences in ductility are not due to carbon segregation or differences in grain size. The lowest values noted were as follows:

Ultimate strength: 48,000 lb. per sq. in in the root of a 10-in., 20-lb. channel.
Elongation: 13.0 per cent in the root of a 10-in., 15-lb. channel.
Yield point: 27,600 lb. per sq. in. in the root of a 10-in., 20-lb. channel.
Proportional limit: 14,700 lb. per sq. in. in the toe of a 10-in., 20-lb. channel.

Basing judgment on weighted averages for whole shapes, the most representative specimen for H-columns may be obtained from the middle of the outstanding flanges. For the channels the web specimens best represent the average in strength tests and the root specimens in elongation measurements. For plates, specimens from the centers are somewhat less variable than the edge specimens and just as representative.

Die Castings Under Investigation

Under chairmanship of H. A. Anderson of the Bell Telephone Laboratories a committee of leading producers and consumers of die castings has embarked on a program that will require the manufacture and testing of approximately 45,000 alumi-

(*Concluded on page* 61)

Ranges in Average Properties

Property Tested	Kind of Stress	Highest Average Stress, Lb. per Sq. In.	Shape Having Highest Stress	Lowest Average Stress, Lb. per Sq. In.	Shape Having Lowest Stress
Proportional limit	Tension	39,700	8-in., 32-lb. H-column	25,100	10-in., 20-lb. channel
Yield point	Tension	41,800	8-in., 32-lb. H-column	31,700	10-in., 20-lb. channel
Ultimate strength	Tension	64,200	8-in., 32-lb. H-column	52,200	10-in., 20-lb. channel
Proportional limit	Compression	37,600	10 by ⅞-in. plate	22,500	10-in., 15-lb. channel
Yield point	Compression	40,900	8-in., 32-lb. H-column	30,900	10-in., 20-lb. channel

Care of Anti-Friction Bearings

Chicago Meeting of Association of Iron and Steel Electrical Engineers Was Given Over Also to Electric Drives

DEVELOPMENT and conservation of power, as well as distribution of cost of energy; application of electric drives; control instruments and anti-friction bearings were foremost among the topics discussed by members of the Association of Iron and Steel Electrical Engineers at their twenty-fourth annunal convention, held June 25 to 28 at the Hotel Stevens, Chicago. Ninety-five manufacturers displayed advanced equipment in the exhibition hall of the hotel.

Value of Ball and Roller Bearings Stressed

DISCUSSING anti-friction bearings for roll necks, J. H. Van Campen, chief engineer E. W. Bliss Co., Salem, Ohio, stated that success depends principally upon three factors: (1) Selection of the proper type and size of bearing; (2) proper mounting of the bearing on the roll neck; (3) lubrication of the bearing.

"Of the various types of mills," he said, "the backed-up type such as the cluster mill and the four-high mill offer the best conditions for anti-friction bearing applications, as the allowable space limits are greater than in any other type of mill. Next comes the two-high mill, and last the three-high mill. The greatest percentage of anti-friction bearing applications to date have been made on the backed-up type of mills.

Keeping Dirt Out of the Bearing

"In sealing anti-friction bearings used on roll necks, and where the speed conditions permit, the most effective method appears to be in applying grease, which should be made from a good grade cylinder stock oil having a viscosity of 150 sec. at 100 deg. Fahr. universal Saybolt, under a slight constant pressure. Pressure applied should be so that there is a small leakage of grease from the seals. This will not allow any infiltration of dirt, scale or water, and will give protection to the bearing.

"Another important feature, essential to the success of anti-friction bearings on roll necks, is the care used by mill crews when removing and replacing the bearings during roll changes. These bearings are a fine piece of mechanism and very expensive. Therefore, no dirt should be allowed to get into the mountings when they are removed. The roll necks should be cleaned thoroughly when replaced, and the bearings properly adjusted in the mill before beginning operations.

"There is no doubt that it would be well worth the time and expense of mill operators using anti-friction bearings to take the bearings out of their housings and thoroughly clean them with a light oil about every six months, to eliminate accumulation of dirt, grit and so forth, which gets into the bearings, as this would greatly prolong their life.

"There are today approximately 150 mills in this country which have anti-friction bearings on the roll necks. Most of these have been installed during the past two years."

Bearings from Viewpoint of Operator

THAT the ball or roller bearing is not a panacea for all bearing trouble was admitted in a paper on "Anti-Friction Bearings for Electric Motors," by J. S. Murray, electrical engineer, Follansbee Brothers Co., Follansbee, W. Va. "Properly selected and applied, however, they offer a definite and tangible return on investment. Improper application, except in rare cases, results in unsatisfactory service and high maintenance costs. The fundamentals of anti-fricton bearing practice must be understood, to obtain its most satisfactory performance.

"Due to the comparatively small width of anti-friction bearings, the projected area between the bore of the inner race ring and the outside diameter of the shaft leads to high values of pressure under usual operating loads. This pressure will amount to from 500 to 1000 lb. per square inch. This intensity of pressure requires a positive means for securing the two together, to prevent relative

Salient Facts on Motor Drive

ECONOMIES in electric operation have resulted in practically a 100 per cent application of motor drive in new mills laid down in recent years. Fully 55 per cent of all rolling mills in this country are now electrically driven. Main roll electric drives represent over 2,000,000 installed horsepower, and this is increasing at the rate of 13 per cent annually.

Steel mill power plants are now using individual generating units as large as 30,000 kw.

Since 1919 the steel industry has increased tonnage output per wage earner by 56 per cent.

rotation. If clearance exists between these parts, there will be a rotation similar to that of a spur gear meshing with an internal gear of slightly larger pitch diameter. This creeping under high pressures will develop destructive wear of shaft, with heating. To overcome this, it is necessary to have a press fit of inner race on the shaft, and whenever possible secure the race against a shaft shoulder by an adequate locking device.

Ample Lubrication Essential

"Today there are few motors built which do not provide for ample lubrication space, to allow for enough grease or oil to insure operation over a long period of time without renewal. There is little wearing out of the lubricant, since it has only two functions to perform. The first is to lubricate the parts of the retainer in contact with the balls or rollers and the second to keep the highly polished surfaces from corrosion. As a result, only a small quantity of oil or grease is required, and consequently the lubrication problem is greatly reduced. Several manufacturers now make a neutral mineral lubricant which is desirable for anti-friction bearings. At intervals of from one to two years, the old grease or oil should be replaced with new lubricant. The only precautions which need be taken are to keep the lubricant clean and not to use too much of it.

"Where there is a long overhang of the shaft beyond the bearing, or where the load to be carried is large, it is usual practice to mount a roller bearing at the drive end of the shaft, with ball bearing at the opposite end for thrust. This arrangement obviously eliminates difficulties due to expansion of the shaft, as the rollers of the roller bearing may move laterally across the face of the outer ring.

"On very large motors, subjected to heavy radial loading with comparatively light end thrust, a combination of two roller bearings is employed. The roller bearing at the closed end of the motor is of the self-contained type, locating the armature endwise, while the drive-end bearing is of the separable type. Some manufacturers prefer to use the self-contained roller bearing at each end of the shaft, in which case the drive-end bearing is allowed to float endwise."

Electric Drive for Rolling Mills

SELECTION of motors for main drives of merchant, bar and rod mills was discussed by C. B. Houston, General Electric Co., Schenectady, N. Y. After reviewing the development of various types of mills and their drives, he called attention to the fact that there are now in use on both rod and merchant bar mills about every form of motor, both alternating and direct current, that exists. There is to be also the wound-rotor induction motor with almost every conceivable form of speed-adjusting equipment—Scherbius, Kraemer and frequency-converter types. Some of the latter are in operation at the International Nickel Co., Huntington, W. Va., and also at the Laclede Steel Co., St. Louis. Alternating current adjustable-speed, brush-shifting motors are applied to the 14-in. and 9-in. mills at the Halcomb Steel Co., Syracuse, N. Y.

"Strange to say, it was not until early this year," he said, "that the first synchronous motor has been sold for driving a rod or merchant bar mill. This is an 800-hp., 300 r.p.m., 85 per cent power factor, 2200-volt, 60-cycle motor and is intended to drive four stands of the 10-in. merchant mill No. 2 at the Madison, Ill., works of the Laclede Steel Co.

Tendency to Use Direct Current

"Direct current motors, with their adjustable-speed characteristics, are used with and without regulating devices. In fact, there is an ever growing tendency toward a greater use of direct current because of the flexibility which its application makes available in operation of the mill. Direct current motors are applied even on continuous rod mills, where not many years ago alternating current motors with some form of speed adjustment were used. This is true even at some additional expense of initial cost or lower efficiency, although, with the improvements which have been made in recent years in the design and manufacture of direct current apparatus, there does not always exist a differential either in cost or efficiency in favor of alternating current machines. For the continuous and for many of the semi-continuous mills only direct current can logically be considered, as for example the Illinois Steel Co. 10-in. mill No. 4, or even the Bourne-Fuller Co. new 10-in. merchant mill.

[*Other topics will be reported in next week's issue.*]

Two Pacific Coast Uses of Steel

Metal net coverings over manholes (left) are used by the Pacific Gas & Electric Co., San Francisco, to protect workers in the manhole and to keep pedestrians from falling into them. The coverings consist of two frames hinged in the center and covered with wire sufficiently strong to bear the weight of an automobile.

A portable safe (right) carries cash between the cashier's department of the Emporium department store in San Francisco to the bank's money truck. It is regarded as too heavy for bandits to pick up and yet may easily be wheeled along by one person.

Productivity Per Man Employed

Study of Pig Iron Output as Symptomatic of Manufacturing in General—Enormous Gain in 75 Years

PRODUCTION of pig iron in the United States increased 7178 per cent between 1850 and 1925, while during the same period the production per man increased 4928 per cent, according to Ethelbert Stewart, commissioner of labor statistics, Department of Labor, in an article on productivity of labor appearing in the June number of *Monthly Labor Review*. In 1850 the number of employees at the blast furnaces was 20,298, while the output was 504,245 gross tons, and the production per man was 25 tons. In 1925 the number of employees was 29,188, the output 36,700,566 tons and production per man 1257 tons. Using 1850 for the index number 100, the 1925 productivity index number is 5028.

Mr. Stewart pointed out that the purpose of his article is to show the great and continuous spread over three-quarters of a century between the number of employees and the volume of production. After showing that there was employment of less than 9000 more persons at blast furnaces in the 75 years, or an increase of 44 per cent, Mr. Stewart declared that the manufacturing industries, particularly as represented by the blast furnaces, are not going to take care of the increase in the working population. He did not go into the question of increased consumption of pig iron per capita, nor did he deal with production along the lines of two articles by W. S. Pilling in THE IRON AGE of June 6, 1912, and in THE IRON AGE of April 28, 1921, showing production of pig iron by decades, both in tons and per capita of population.

Without referring by terms to the modern mechanization of the blast furnace and the vast increase in its capacity as compared with former years, Mr. Stewart's discussion is reminded of this subject and the problem which he sees is stated as follows:

"Concretely stated, the facts are these: The increase in population from 1850 to 1925 was 397.5 per cent. If we take blast furnaces as an example, the take-up of this population by industries increased 44 per cent. Production increased 7178 per cent. Production per man increased 4928 per cent. Stated differently, the number of wage earners in blast furnaces in 1850 was 882 per million of population. In 1921, which, however, was a slump year, there were 173 wage earners in this industry per million of population. And many other industries, while not so spectacular, showed the same tendency.

"It must be apparent that the attitude which one will take toward these figures will depend upon whether one is interested in the prosperity that comes from enormous production and almost startling output per employee or whether one is looking for a job. The problem of today is to reconcile these two points of view."

In his table the number of employees engaged at blast furnaces in census years (except 1880) is taken from the census reports. In 1880 the Bureau of Census so classified this group that the employees shown included those in foundries and a number of other industries, which made the figures for blast furnaces in that year unusable. In 1890, however, the census returned to its old classification. The figures of total production of pig iron in the United States were taken from the census reports from 1850 to 1890 and the reports of the American Iron and Steel Association from 1899 to 1925.

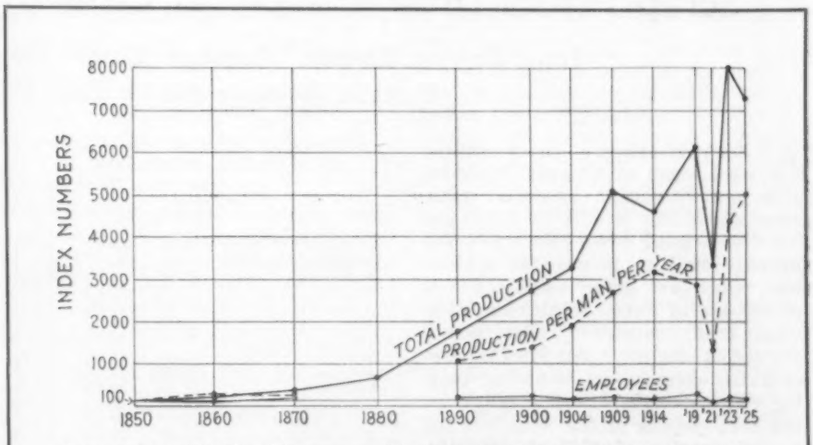
It was pointed out by Mr. Stewart that between 1850 and 1870 there was no great divergence among the three factors of production, employment and output per man-year. From 1870 on, he explained, the trend of production was sharply upward. The index number in 1870 was 363. By 1890 the index of production had reached 1754 and the index of output per man-year 1060, while the employment index was 165.

"One of the more puzzling problems revealed by this presentation," said Mr. Stewart, "is the tremendous drop in 1921. Actual employment dropped below the figure of 1850, or 71 years earlier. While production in 1921 was only about half what it was in the preceding census year, it still showed an index number of 3310, while the output per man-year dropped to 331 tons, the index number being 1324, against 3180 in 1914 and 2864 in 1919.

"The tremendous slump in productivity just after the war deserves a much more careful study than it has received. We do not know all of the factors entering into this. The slump was world-wide, affecting the countries which did not participate in the war with almost as great severity as those that did. One of the perfectly apparent reasons is the demoralizing effect upon all labor of the cost-plus plan of letting contracts during the war. Under a cost-plus plan the less a worker does the more valuable he is to his employer, and petty bosses were not slow in making this apparent to the workers themselves. We are fortunate in having recovered from the influence of that diabolical scheme as rapidly as we have.

"A second clear explanation is that the younger, more enthusiastic, energetic and 'peppy' employees in all industries enlisted for the war, leaving a much less experienced and less dependable group of workers to take care of industry. Even when the enlisted men returned, the mental and physical effect of the war was very noticeable for some time.

"Another cause, and perhaps a more easily measurable one, was that, though production fell from practically 37,000,000 tons in 1920 to less



Compared with the Enormous Advance in Output of Pig Iron the Increase in Number of Employees Has Been Insignificant. It is explained by a greatly improved output per man.

than 17,000,000 in 1921, a certain proportion of the employees must be retained if the plant is to operate at all, and that regardless of production. An apparent weakness in this reasoning is developed by the fact that the index of employees fell much more noticeably than did the index of production. For instance, the index of employees in 1919 was 213 and in 1921 it was 92, while the index of production dropped from 6151 to 3310.

"In view, again, of the widespread decrease in productivity, affecting Denmark, Norway and Sweden practically as much as it did England and the United States, attention must be called to the fact that a more comprehensive study of that slump than has yet been made is needed.

"Even the second reason here assigned is not entirely defensible, for as jobs become scarce there is the general tendency to work hard to hold on to the job in hand."

Referring to the chart accompanying the article, Mr. Stewart pointed out that it shows that, while production declined from 1909 to 1914, production per man per year was going steadily up, and that, while total production from 1914 to 1919 was going up rapidly, production per man per year was going down. It was explained that the chart, while drawn in continuous lines, is really a "spot" chart and speaks for census years only, because the number of employees, which is the essence of the calculations, could be secured only for census years. From 1850 to 1900 these censuses covered 10-year periods; from 1900 to 1919 they covered 5-year periods; since 1919 they have covered 2-year periods.

"Therefore, when we say that production declined from 1909 to 1914, it does not mean that this was true of each year during the period," Mr. Stewart said, "and as a matter of fact it was not true. But from the very inception of the war, and before the United States entered the conflict at all, production per man began to decline. On the other hand, from 1923 to 1925 production dropped sharply while output per man per year went steadily upward. And these facts likewise are shown the world over, in so far as productivity figures in foreign countries are available and dependable. The psychological effect of war upon human productivity is here only suggested. There is no serious attempt to furnish an answer."

Scrap Prices Drop Sharply at Close of First Half of Year

June Shows Lowest Average Since December — Second Quarter Average Above First Quarter

AVERAGE prices of heavy melting steel scrap at Chicago, Philadelphia and Pittsburgh developed weakness about the middle of May and have been going down ever since. The average on May 15 was $14 a gross ton, which has given way to $13.25 at the end of June. With one exception, every week in that period showed a decline. At $13.74, however, the average for the second quarter was above the $13.69 average for the first quarter of the year. In the second quarter of 1927 the average was $14.09 a ton.

Meantime, pig iron has dropped, all through the second quarter of the year, to the lowest level it has had in more than 12 years. The differential between THE IRON AGE pig iron composite at the end of June and the scrap average was less than $4 a ton. This compares with more than $6 a ton about two years ago.

Finished steel has had only slight fluctuations since early 1927. It has declined during the second quarter to 2.341c. a lb., which, with the exception of the level of last fall and early winter, is the lowest it has had since the summer of 1922.

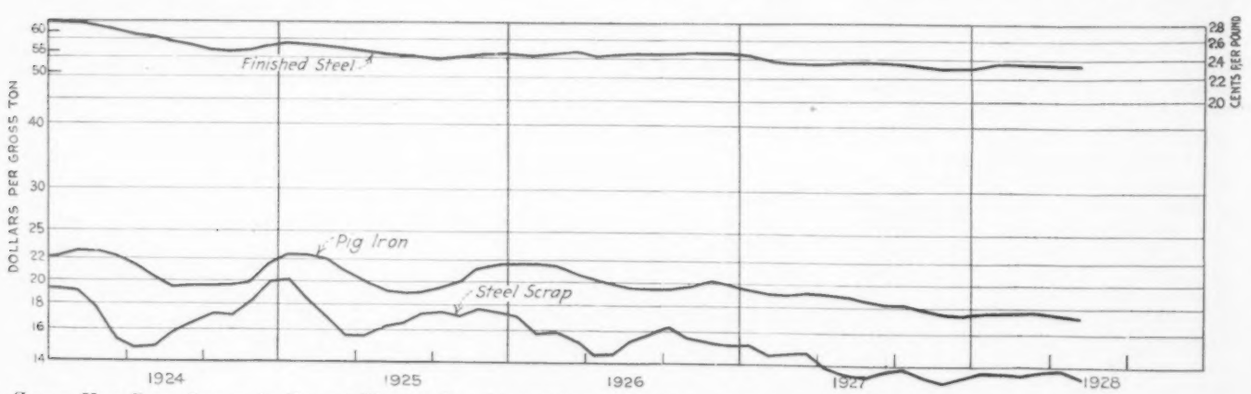
Comparative figures for 30 months, covering steel scrap, pig iron and finished steel, are given in the table. The diagram carries the story of these changing prices over a period of more than four years.

COMPOSITE PRICES ON IRON AND STEEL PRODUCTS

	(Per Gross Ton) Steel Scrap	Pig Iron	Finished Steel, Per Lb.
1925 *average*	*$17.12*	*$20.58*	*2.465c.*
January, 1926	16.97	21.79	2.447c.
February	15.50	21.77	2.428c.
March	15.83	21.65	2.433c.
April	15.27	20.96	2.439c.
May	14.35	20.69	2.416c.
June	14.40	20.00	2.420c.
July	15.42	19.51	2.431c.
August	15.88	19.46	2.431c.
September	16.25	19.46	2.439c.
October	15.58	19.69	2.449c.
November	15.25	20.13	2.453c.
December	15.08	19.94	2.453c.
Year's average	*15.48*	*20.42*	*2.439c.*
January, 1927	15.17	19.44	2.432c.
February	14.58	19.07	2.378c.
March	14.65	19.03	2.367c.
April	14.71	19.21	2.360c.
May	13.95	19.09	2.360c.
June	13.60	18.92	2.369c.
July	13.48	18.56	2.367c.
August	13.80	18.17	2.367c.
September	13.92	18.03	2.357c.
October	13.48	17.96	2.319c.
November	13.18	17.59	2.299c.
December	13.48	17.55	2.310c.
Year's average	*14.00*	*18.55*	*2.357c.*
January, 1928	13.70	17.63	2.318c.
February	13.71	17.73	2.361c.
March	13.65	17.73	2.362c.
April	13.81	17.67	2.359c.
May	13.90	17.45	2.350c.
June	13.52	17.23	2.341c.
Average 6 mo.	*13.72*	*17.57*	*2.349c.*

SKF Dominant in German Bearing Industry

HAMBURG, GERMANY, June 16.—With the acquisition of the Riebewerke, the Svenska Kegellager Fabriken Aktiebolag (SKF), is a dominant figure in German production of roller and ball bearings. With a plant at Stuttgart, Germany, SKF has been manufacturing for some time and recently instituted suit against the Riebewerke for infringement of patents. This was followed by the purchase of the Riebewerke by SKF. There are now only two German ball and roller bearing manufacturers not controlled by the Swedish company.



Scrap Has Gone Lower in Recent Weeks, Reaching Almost the Low Level of Last Fall. Pig Iron is the lowest it has been in almost 13 years and finished steel is below its prevailing level of the past 5 years

June Pig Iron Output Declines

Estimates, Collected by Wire, Make the Daily Rate 3221 Tons or 3 Per Cent Less Than May—Net Loss of 8 Furnaces

ACCORDING to data gathered by wire on July 2 from producers estimating their output in most cases, the June production showed a decline from that of May of about 3 per cent. The estimated total for last month was 3,081,300 gross tons, or 102,710 tons per day. This compares with an actual production in May of 3,283,856 tons, or 105,931 tons per day. The decline in June was therefore 3221 tons per day, or about 3 per cent. In May there was a decrease from April of about ¼ of 1 per cent.

These preliminary returns indicate that there were six furnaces blown in and 14 shut down in June—a net loss for the month of eight furnaces. The number operating on July 1 was apparently 190 furnaces, against 198 on June 1 and 195 on May 1. The principal loss was in steel making furnaces.

Pig Iron Production by Districts, Gross Tons

	June (30 days)	May (31 days)	April (30 days)	March (31 days)
New York and Massachusetts	200,322	212,333	205,556	216,224
Lehigh Valley	60,600	77,195	81,140	80,058
Schuylkill Valley	52,428	53,162	60,062	51,325
Lower Susq. and Lebanon Valleys	29,207	32,019	31,522	33,301
Pittsburgh district	606,178	700,880	663,784	639,693
Shenango Valley	102,672	114,779	100,073	101,946
Western Pennsylvania	117,822	126,790	116,405	101,365
Maryland, Virginia and Kentucky	116,658	100,508	102,678	103,857
Wheeling district	144,108	124,948	115,284	133,764
Mahoning Valley	289,902	309,842	310,227	296,491
Central and Northern Ohio	350,352	357,900	336,200	330,176
Southern Ohio	40,756	26,380	25,548	25,729
Illinois and Indiana	633,594	694,636	693,271	715,439
Mich., Minn., Mo., Wis., Colo. and Utah	127,797	137,987	134,163	139,101
Alabama	201,554	207,045	199,487	223,314
Tennessee	7,350	7,452	10,104	7,891
Total	3,081,300	3,283,856	3,185,504	3,199,674

Actual data for the June pig iron production will be published in THE IRON AGE, July 12. The table gives the estimated production by districts for June and the actual output for the three preceding months.

To Reorganize New York Metal Exchange

At a meeting of the stockholders of the New York Metal Exchange, 23 William Street, New York, Thursday, June 28, it was decided to revise the rules and reorganize the exchange. The object is to make the institution a more active factor in the non-ferrous metal markets. Activities will center first in the tin market, with the aim of augmenting dealings later in zinc, lead and copper.

Malleable Castings Orders Ahead of Last Year's

Production of malleable castings in May totaled 61,458 net tons, against 56,880 tons in April, according to reports received by the Department of Commerce from 133 identical plants, seven of which, with an aggregate monthly capacity of 3850 tons, were idle during May. Except for March, production in May was the greatest for any month in more than a year. It compared with 57,655 tons in May, 1927.

Orders booked in May amounted to 54,429 tons, against 53,099 tons in April, while operations were at the rate of 67.3 per cent and 62.5 per cent respectively. May shipments involved 58,264 tons, compared with 57,372 tons in April. Shipments in May were the largest, except for March, in more than a year. Last May the total was 57,269 tons.

For the five months ended with May production aggregated 295,523 tons, against 292,124 tons for the corresponding period of last year; orders were 276,830 tons and 268,438 tons respectively; operations, 64.5 per cent and 55.2 per cent, and shipments, 280,076 tons and 286,374 tons.

Addition Built for Expansion Upward

Heavy foundations in a new building being added to the plant of the Brown Instrument Co., Philadelphia, will permit other floors to be added later, as requirements demand. The present structure will be two stories high, measuring 44 x 60 ft. in plan. Construction will be of the fireproof type.

This is the third addition made to the Brown plant within the last eight years. Its primary purpose is to provide research facilities needed with the rapid expansion in the variety of the company's products and a continual widening in the application of instruments to the activities of industry and science.

Bar Iron Plants May Be Merged

Charles Hart, president Delaware River Steel Co. (which operates a blast furnace at Chester, Pa.), who recently became active in the management of the Lebanon Iron Co., Lebanon, Pa., is negotiating for the purchase of the Scranton Bolt & Nut Co., Scranton, Pa., with a view to the consolidation of the properties. C. E. Brodhead, vice-president Scranton Bolt & Nut Co., informs THE IRON AGE that nothing has been concluded.

The Scranton company was organized in 1899 and has been an important factor in the East in the manufacture of iron bars, bolts and nuts and spikes. Its annual capacity is about 40,000 tons of bars. The Lebanon Iron Co. has an annual capacity of about 35,000 tons. Included in the equipment of the Lebanon plant are eight Ely mechanical puddling furnaces.

Will Increase Output of Auto-Body Sheets

The Otis Steel Co., Cleveland, through its board of directors, has authorized the carrying out of an expansion program in order to increase its output of full finished automobile body sheets. The plans contemplate additions to its soaking pit and blooming mill units at its Riverside works. Three new soaking pits will be erected. An additional heating capacity of 7200 tons of ingots per month will be provided and a corresponding increase in semi-finished steel. A new normalizing furnace, electrically operated, will be erected, with which the company will be able to increase its finished sheet output 2000 tons per month.

Concrete Bar Sales Expand

The Concrete Reinforcing Steel Institute reports that bars sold and shipped in the first five months of 1928 where 12 per cent above the tonnage in the corresponding period in 1927 and 4 per cent above the same period in 1926.

A. I. FINDLEY
Editor

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W. W. MACON
Managing Editor

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For More Economic Distribution

ON nothing have men in the steel industry been more agreed, and for a long time agreed, than on the need of better methods for the distribution of their product. But admitting the weakness of a steel salesmanship that wins but small profit on an enormous investment is quite another thing from actually squaring selling policies with the familiar exhortations on the evils of price cutting.

The reasons for the divergence between the preachments of Gary, Schwab and others and the practice of steel company sales departments are well known. As commonly discussed they are an overbuilt steel industry, the Sherman act, preferred customers, unrestrained selfishness of some sellers, machinations of some purchasing departments, and too often a salesmanship that knows no higher skill than a lower price.

Complicated and baffling as the problem is, we need not assume that the steel industry will be continually defeated by it, even granting that Congressional relief through amendment of the Sherman act is more remote than some other remedies. Meanwhile the subject of better selling and distribution is having attention from various branches of the metal-working industries. One effort in particular has advanced to a point at which its results can be appraised and some measure taken of its adaptability to wider fields of manufacture and distribution. We refer to the plan under which the Bolt, Nut and Rivet Manufacturers' Association has been working with such success in the past two years in cooperation with the hardware and mill supply jobbers of the country.

Two days of last week were given to a largely attended conference in New York, as told at length on other pages, at which steps were taken to extend to other products commonly handled by distributers in iron, steel, heavy hardware and supply lines, the methods originally devised for the distribution of the product of the bolt, nut and rivet industry. Knowledge of these methods has been carried to every iron and steel jobbing center of the country by the officers of the bolt and nut association and has attracted attention widely through discussions at various trade conventions in the past eighteen months.

At a time when the cost of distribution is challenged in so many quarters, beginning with the farmer, as responsible for the high level of living costs, it is noteworthy that the bolt and nut manufacturers' plan meets the challenge by a claim of economies not only for manufacturers and distributers but for the ultimate consumer. That, indeed, is the test which every organized effort must meet, that sets out to change existing competitive lines. It is the test which separates good from bad trusts, and is in no small part the basis on which the rule of reason is applied in the enforcement of the Sherman act. As was well suggested by Mr. Alexander, president of the National Industrial Conference Board, in his address before the distribution conference last week, the issues involved are to be judged not from the standpoint of the individual producer alone but from the broad viewpoint of national economy.

On the showing it has thus far made, the plan of the nut and bolt and rivet manufacturers has gone far toward commending itself both for its rescue of an industry from a profitless condition and for the economic benefit a stable market has conferred on both distributer and consumer.

Hoover As An Engineer

WASHINGTON was a land surveyor. We doubt if he should be characterized as an engineer. If Herbert Hoover should be elected to the presidency, it may correctly be said that he would be the first engineer to be installed in that great office. Also, he would be the first economist and the first administrator of business affairs, for the great engineer, especially the great mining engineer, is almost bound to be those things as well as just engineer. Hoover's professional colleagues tell us that they regard him as a great engineer. Indeed there is ample evidence that they so regarded him more than 15 years ago, long before his name had popular recognition.

After some early experience in the United States, Hoover became associated with the great engineering-managerial house of Bewick, Moreing & Co., and worked for it in China during some stirring times and later in Australia when the gold mines of Kalgoorlie were being developed. He worked for it so efficiently that very soon he was invited to become a member of the firm, and while still a very young man he had earned a competency for himself. He played a great part in directing the operation of the whole group of gold mines at Kalgoorlie; and later, turning his attention to zinc, he was most instrumental in organizing the production of zinc ore at Broken Hill in Australia and in developing the great Bawdwin mine in Burma.

But while becoming thus an administrator and financier Hoover never relaxed from the purely professional part of his engineering, and in that interest he gave freely of himself to his professional colleagues and to the public, this being distinct from what he gave to the stockholders in his companies. He was the first to clarify the minds of mining engineers on the correct principles of valuing mines, formulating what came to be known as the Hoover laws, the Hoover actuarial tables, etc. This, moreover, directed the collective en-

gineering mind into economic thought, for the natural corollary of the principle that a mine is the more valuable the more quickly it is liquidated is the question of the probable price for its product.

Hoover next found time to write a treatise on the principles of mining, published in 1909, in which he described and discussed the technical methods of extracting ore from the ground. This was immediately pronounced a classic of technical literature, and after 20 years still is so viewed and so consulted. It was of the kind of technical treatises that live.

Even better known, however, became his translation of Agricola's *De Re Metallica*, in which Mrs. Hoover collaborated. This was the first of the world's treatises on mining and metallurgy and its German author wrote it in Latin, as was the custom of scientists of the 16th century. Academic scholars had tried time and again to translate this great work and had made sorry messes of their jobs, for the alchemists and their successors knew of many things that the Romans did not, and in writing of them in Latin they were obliged to coin words that were not to be found in any lexicons. Thus the scholars could but guess their meaning, and being ignorant of the technology they often guessed wrong, sometimes ludicrously.

With Mrs. Hoover as the classicist and Herbert Hoover as the technologist there was no guessing, but correct inference out of knowledge of what the author was talking about. Along with this Hoover explained and discussed matters in voluminous annotations which if collected would have constituted in themselves a treatise on the history and philosophy of mining. For this great translation the academic world bowed in respect and to Mr. and Mrs. Hoover the Mining and Metallurgical Society of America awarded its gold medal.

All of these things happened previous to the Great War. In the upheaval of August, 1914, many Americans found themselves stranded in London. Hoover, who was in London at that time, organized his professional colleagues to finance their fellow citizens and get them home. Probably no one but Hoover would have thought of undertaking such a thing. When he appealed to his fellow mining engineers he knew what he was doing. Most mining engineers have been travelers to remote places. At one time or another they have lost their baggage or their purses, or have encountered all imaginable difficulties that they have had to overcome. The predicament of thousands of helpless Americans in Europe was to them only old things multiplied, and they unraveled the tangle with the expedition that everybody knew 14 years ago but has now forgotten.

After that the career of Herbert Hoover and his uniform efficiency became matters of general knowledge. Any publicist can write of them. We are writing of Hoover the engineer.

The Vice-Presidency

WITH the end of the Coolidge administration there will have been 35 presidential terms in the United States and that great office will have been held by 29 men. Of these six died in office. Of the 29 presidents three were elected directly to the presidency from the vice-presidency. These statistics show how important the vice-presidency has been in our political system. Nearly one-third of our presidents have previously held the office of vice-president, three of them having succeeded by election and six following the death of the president. Of the latter, two retained the presidency by subsequent election. It may be deduced from this that five out of nine of the vice-presidents who succeeded to the presidency were wanted by the people. Of the other four three were colorless, but one was threatened with impeachment, wherefore he was not colorless. The historical record makes it clear that the vice-presidency is not a nomination lightly to be considered.

In recent practice, a president having been nominated after a factional fight, the nomination for the vice-presidency has been determined on grounds of political expediency in respect to vote-getting, and this has often resulted in the secondary nominee being more or less out of sympathy with his principal. Thus, Mr. Dawes as vice-president has been distinctly out of sympathy with Mr. Coolidge. Often, also, the vice-presidential nominee has been of inferior standing, a man whom the people would never think of putting up for president in the first instance. Sometimes the vice-presidential nomination has been careless and accidental. Of course, we must not overlook that such casualness gave us Roosevelt and Coolidge.

The last is really the important thing. Our national experience, during 140 years, has demonstrated that the possibility of the vice-president becoming president by accident is one out of five. We ought therefore to use great care in selecting the man for that office. And if we are minded to elect to the presidency a man who is an exponent of certain policies, his understudy ought logically to represent the same policies.

Seasonal Steel Prospects

AT this mid-year time it is important to allow for seasonal trend in gaging the favorableness of steel tonnage prospects. It is nothing to predict that steel production will be smaller in the second half of this year than in the first half, for that is normal; hence unfavorable deductions should not be drawn from the prospect, unless it is unusually unfavorable, which is not the case.

In only one of the nine years that have elapsed since the war was more steel produced in the second half than in the first half. That exceptional year was 1922, a year of recovery from severe depression. The other eight years showed an average decline of 10¾ per cent in production from the first half to the second half, and the normal second half has one more working day than the first half. In rate of production the division is a 53-47 division, which may reasonably be taken as standard.

Actual half yearly production of steel ingots is shown in the table below. In certain years round figures are given for the first half because the official monthly figures were not complete. The totals are official:

Steel Ingot Production—Gross Tons

	First Half	Second Half	Total
1919	17,500,000	16,194,795	33,694,795
1920	20,825,000	20,056,392	40,881,392
1921	10,320,000	8,904,084	19,224,084
1922	15,875,000	18,693,418	34,568,418
1923	23,326,965	20,158,700	43,485,665
1924	19,737,034	17,074,123	36,811,157
1925	22,383,071	21,757,667	44,140,738
1926	24,153,809	22,782,396	46,936,205
1927	24,000,000	19,776,717	43,776,717

Production in the first half of this year was probably above 24,500,000 tons, but there was the benefit of an

extra working day, while the second half will be short one working day.

History does not suggest that steel prices are lower in second halves than first halves on account of the difference in tonnage. A convenient and simple reference is the table on page 113 of THE IRON AGE annual number, Jan. 5, 1928, showing the monthly average composite price of finished steel. From the figures no such trend can be seen. Allowance of course must be made for the fact that there were generally falling prices after 1923 until December of last year.

It will be observed from the above table that 1927 showed a larger drop from first half to second half than any other year. This year has made a good start by passing the first half of last year and has retained the lead to date. It will be particularly easy for the second half of this year to compare favorably with the second half of last year. It would require only a 67 per cent operating rate to make the same tonnage. That is under the percentage rates reported for the second half of last year, but the capacity rating is raised 2½ per cent for this year.

Just why there should naturally be lighter production in the second half of a year is not fully explained. Rails are an influence, the northern roads requiring delivery during the first half of the year for their season's replacements; and a corresponding principle probably applies in mild degree in many activities.

Demands for Better Tonnage Steel

JUST 100 years ago the Institution of Civil Engineers was incorporated in Great Britain by royal charter, and during the first week of last month meetings were held to commemorate the occasion. There was a wide diversity in the subjects considered, since the scope of the institution includes nearly all branches of engineering. Progress was recounted in reinforced concrete construction, railroads, electric traction, shipbuilding, fuel economy, boiler construction, power transmission, domestic heating—many of these subjects being quite outside the field of civil engineering as understood in America.

Even the most rapid glance through the "introductory notes" and the reported discussion cannot fail to reveal the all-important place iron, steel, and the alloys have had in this diverse engineering development. Of course, many branches of applied science which were non-existent and undreamed of a hundred years ago have grown into such large proportions as to affect the daily life of every citizen. Many revolutionary changes dependent upon a cheap and plentiful supply of uniform steel had to wait perforce until the open-hearth process was perfected. Other progress, as in electricity, leaned more heavily on copper. But one cannot help realizing, when he stops to think of the century's amazing development of machinery and fixed structures, that it could not have gone very far except for the metallurgist.

Inspiring though these thoughts may be, it is more important to look ahead. If past progress has been due to sound metal, that of the future will as certainly require continual improvement in quality. Railroad engineers are asking a longer rail which will safely bear the heavy wheel loads without rapid wear. Bridge and structural engineers want a mild steel that can be stressed to a higher safe figure, and above all one that does not rust so fast. Shipbuilders say they could reduce the weight of a hull 15 per cent if they were furnished plates and beams with a minimum proportional limit of 38,000 pounds per square inch. Steam engineers now ask metallurgists for an entirely new set of metals for the high superheat plants that must be installed if steam is to compete with internal combustion engines. The needs of aircraft for special alloys are well known.

But whereas the demands for special qualities were recently confined to products of small tonnage, the requirements of the immediate future will be for higher grades of strictly "tonnage" steel. Rails have to be better. Mild steel must corrode less. Ship steel must be stronger. Sheet steel must be smoother and take more punishment. Steel is no longer just steel. More and more of the common or garden varieties will be bought with an intelligent eye to the most service per dollar.

Fortunately the way of improvement in many directions is well known. We know how intimately the choice of the raw material and the melting practice affect the toughness of steel rails. We know how a little copper in steel improves the resistance to atmospheric corrosion, and how a little extra manganese increases the elastic limit remarkably. We know how important ingot practice, soaking, and rolling mill drafts and temperatures are to surface finish and uniform physical properties. All such considerations will have increasing weight in the tonnage mill as the months go by. Research will discover other ways to improve quality.

It would be the greatest error to depend too much on steels as standardized at present. The Portland cement industry has been rudely awakened from such a state. "Cement is cement, take it or leave it," they said, and, until people started taking wholly unstandardized products which set hard and strong in hours instead of days and did not crumble in alkaline ground waters, progress in quality was slow—in fact unnecessary. By this recent development concrete, the principal competitor of steel for bridges and structures, has taken a new lease on life. Steel cannot delay an equivalent or greater improvement if it is to stave off competition from many sides—if it is to provide for the continued advance in engineering and construction.

The Iron Age in a New Garb

WE begin this, the 122d volume of THE IRON AGE, *with a moving of the pages of reading matter close to the front of each issue, and with changes in both the size and appearance of the printed page. By the departure in size, we relinquish our years-long adherence to the golden mean in page proportions but we put into practice what we have preached generally regarding standardization, as these pages now conform to one of the standards that have come into being among periodicals. Otherwise the new arrangement aims to continue, if not to enhance, readability, and what further modifications may be made will look to seeking at all times reader convenience.*

This Issue in Brief

Can the management methods that are making money for the large manufacturers be used successfully by smaller plants? Yes, says engineer, for the savings more than equal the cost of the additional overhead.—Page 1.

* * *

Manufacturing costs must be reduced 10 per cent each year. Machinery builder sets this as the minimum, but has always exceeded it. First requisite in reducing costs is intimate knowledge of costs. The second requisite is that attitude of mind which regards all processes as temporary, to be tolerated only until a better way is found.—Page 6.

* * *

Predicts increase in output of Bessemer steel. Its free-machining and welding properties will not only enable Bessemer steel to hold its own, but will enable it to improve its position, metallurgist believes.—Page 11.

* * *

Too much buying is done without adequate investigation, says machinery builder. Many buyers forget that conditions are constantly changing, and when they send an inquiry to only one supplier, they fail to profit by gains which may have been made.—Page 7.

* * *

Is the cost of buying too high? If it costs too much to interview 50 salesmen, why not select six suppliers who qualify completely, and place the order with one of those six? asks editor. Purchaser should demand firm bids, and shun the two-bidder. Bidders baited by unfair buyers should hold post-mortem comparison of bids, by submitting bids on closed business to their trade associations for report.—Page 11.

* * *

Heat-treating different portions of same part differently is common practice with Ford. In one case a furnace with three heat zones is used, so that varying degrees of hardness may be imparted to different portions of the rear axle shaft.—Page 13.

When buying anti-friction bearings be sure you select the right bearing and apply it properly. Otherwise, unsatisfactory service and high maintenance cost will result.—Page 31.

* * *

Systematic routing and scheduling of work reduces machining time 46 per cent in moderate-sized shop. Formerly foremen were entangled in a mass of details—hunting jobs for the men, hunting drawings, etc. Now they devote their time to supervising operations, with the result that the machine hours on a certain job have been cut from 3640 to 1950.—Page 4.

* * *

If you are performing a certain operation today the same way as five years ago, the chances are that you are behind the times. Industrial history shows that most manufacturing processes are obsolete within five years, says machinery builder. The successful firm is that which studies processes closely and beats obsolesence.—Page 7.

* * *

Are you saddling manufacturing executives with "paper work" which could be done by clerks? In many plants foremen and other department heads are unable to give full time to supervision and study of cost-cutting methods, because of the records they are obliged to maintain.—Page 1.

* * *

Purchasing engineer is the "lookout man" for the organization. He functions as the preliminary research man, for people with something new to offer come to him. Best results are obtained by considering each purchase separately from two angles, commercial and technical.—Page 5.

* * *

Industry suffers from a shortage of skilled labor, while unemployment exists among unskilled workers, says apprentice supervisor. America is not training sufficient skilled labor to supply its needs. Apprentice training is the obvious answer to the problem.—Page 25.

With security yields below interest rates, further liquidation of security prices is to be expected, says Dr. Haney. Yield on common stocks is now only 4.33 per cent, and there are no prospects for a substantial increase in industrial earnings.—Page 26.

* * *

On what portion of your sales do you lose money? Taking business as a whole, 80 per cent of sales expense is producing less than 20 per cent of the volume, says association head. Losses on high-cost business must be paid out of the profits on the 80 per cent low-cost volume.—Page 16.

* * *

Cooperation puts an entire industry on a profitable basis. Bolt, nut and rivet manufacturers are furnished with a common cost system; quantity buyers are listed, and small business is left to jobbers; package sizes have been reduced from 168 to 18. No price agreements have been made, but prices have been stabilized. As a result, the entire industry has gone from red ink to black.—Page 16.

* * *

Copper-bearing iron and steel sheets corrode as quickly as do copper-free sheets when submerged in water. Tests by A. S. T. M. reveal that copper content does not retard corrosion in fresh water, brackish water and mine water.—Page 29.

* * *

Daily output of pig iron declined 3 per cent in June. Average production was 102,710 tons per day, against 105,931 in May. On July 1 there were 190 furnaces in blast, eight less than the June 1 total.—Page 35.

* * *

Quantity buyers should not get lower prices, says C. M. Schwab. "It is the little fellow," he declared, "who is entitled to better prices if anyone is, because the large buyer has chances which the small one has not."—Page 18.

Iron and Steel Markets

Large Steel Orders for Pipe Lines

Total of 175,000 Tons Placed—Steel Shipping Orders Hold Up Despite Holiday Interruption in Operations—Valley Basic Iron Stronger

THE danger of preconceptions regarding the course of steel business has been given fresh emphasis. Independence Day week, as is customary, will see a reduction of activity, but it will be reflected in plant operations rather than in demand. Mills have less contract tonnage than at the opening of the second quarter, but the volume of shipping orders in both releases against past commitments and short-term purchases is holding up well.

At Chicago, bookings for the week were the fourth largest of the year and backlogs increased in virtually all lines except rails and sheets. Present demand there, it is believed, will sustain ingot output at 80 per cent of capacity, following recent declines largely attributed to diminishing rail specifications.

In other districts, buying is more cautious, but without materially reducing the total tonnage reaching the mills for rolling. Releases against expiring contracts for plates, shapes and bars at 1.85c., Pittsburgh, will cover the needs of many consumers through July. On the other hand, some contract buyers did not fully exercise their second quarter options, while those who have placed third quarter contracts at the advanced quotation of 1.90c. evidently expect a downward adjustment of invoice prices in case the market again recedes.

Mill operations are less dependent than formerly on large individual orders, but the maturing of several pipe lines after months of negotiation has added a substantial tonnage to the large volume of business coming from miscellaneous sources, and from the automotive, implement, canning and building industries. For four pipe lines a total of 175,000 tons of steel was ordered during the week, following the placing of 50,000 tons two weeks ago.

The automotive industry continues to take a large tonnage of steel and, as yet, shows no signs of a sharp summer slump. June specifications from motor car builders were only slightly smaller than in May and, while some automobile companies are reducing operations, others are maintaining output without change. The Chevrolet Motor Co. has announced a minimum production schedule of 100,000 cars monthly for the current quarter.

Farm equipment makers, having completed inventories, have resumed full production, with sizable schedules arranged for many weeks to come.

Sustained building activity is indicated by the addition of nearly 30,000 tons to the large amount of structural steel work pending, and by awards during the week of 42,000 tons.

Tin plate mills are well supplied with specifications, but will not be embarrassed by the holiday interruption in operations, since rainy weather has been holding back canning.

Pig iron production in June, estimated from telegraphic reports to THE IRON AGE, averaged 102,710 tons a day, a decline of 3 per cent from the May rate. There was a net loss of eight active blast furnaces during the month. Output for the first half of the year, estimated at 18,520,200 tons, was the smallest since 1924, in sharp contrast with steel ingot production, which will undoubtedly prove a half-year record.

Pig iron prices show no signs of strength except in the Valleys, where there has been another recovery in basic iron to $16, furnace, or an advance of 65c. over the recent minimum. Foundry melt, on the average, is holding its own, although shipments of pig iron to the automotive industry are expected to decline this month, possibly as much as 20 per cent compared with June.

Scrap markets continue to weaken. Heavy melting steel at Pittsburgh has declined 25c. a ton for the third time in three weeks. The same grade has dropped 25c. a ton at Chicago and St. Louis.

The Pennsylvania Railroad has ordered 12,000 tons of track supplies. Leading makers of track spikes have announced an extra of 25c. per 100 lb. for less-than-carload lots in both large and small sizes.

The growth of steel consumption for building purposes is shown by shipments of concrete bars in the first five months of this year, as reported by the Concrete Reinforcing Steel Institute. The total was 12 per cent larger than in the corresponding period last year and 4 per cent greater than in 1926.

The larger domestic producers of gravel fluorspar have announced an advance of $1 a ton to $17 a net ton, mines.

Recovering slightly from its low point, THE IRON AGE composite pig iron price is now $17.25, against $17.21 last week. The finished steel composite remains at 2.341c. a lb. for the fifth week.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At Date, One Week, One Month, and One Year Previous

Pig Iron, Per Gross Ton:	July 2, 1928	June 26, 1928	June 5, 1928	July 5, 1927
No. 2, fdy., Philadelphia	$20.76	$20.76	$20.76	$21.26
No. 2, Valley furnace	16.75	16.75	16.75	18.00
No. 2, Southern, Cin'ti	19.19	19.19	19.69	21.69
No. 2, Birmingham	15.50	15.50	16.00	18.00
No. 2 foundry, Chicago*	18.00	18.00	18.00	20.00
Basic, del'd eastern Pa	19.00	19.00	19.00	20.75
Basic, Valley furnace	**16.00**	15.75	15.35	17.50
Valley Bessemer, del'd P'gh	18.76	18.76	18.76	20.26
Malleable, Chicago*	18.00	18.00	18.00	20.00
Malleable, Valley	17.00	17.00	17.00	18.00
Gray forge, Pittsburgh	18.01	18.01	18.01	19.26
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	105.00	105.00	105.00	90.00
Rails, Billets, Etc., Per Gross Ton:				
O.-h. rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Bess. billets, Pittsburgh	32.00	32.00	33.00	33.00
O.-h. billets, Pittsburgh	32.00	32.00	33.00	33.00
O.-h. sheet bars, P'gh	*32.00*	33.00	34.00	33.50
Forging billets, P'gh	38.00	38.00	38.00	39.00
O.-h. billets, Phila	38.30	38.30	38.30	38.30
Wire rods, Pittsburgh	42.00	42.00	42.00	42.00
	Cents	Cents	Cents	Cents
Skelp grvd. steel, P'gh, lb	1.85	1.85	1.85	1.80
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Iron bars, Philadelphia	2.12	2.12	2.12	2.12
Iron bars, Chicago	2.00	2.00	2.00	2.00
Steel bars, Pittsburgh	1.85	1.85	1.85	1.80
Steel bars, Chicago	2.00	2.00	2.00	2.00
Steel bars, New York	2.19	2.19	2.19	2.14
Tank plate, Pittsburgh	1.85	1.85	1.85	1.80
Tank plates, Chicago	2.00	2.00	2.00	2.00
Tank plates, New York	2.17½	2.17½	2.17½	2.09
Beams, Pittsburgh	1.85	1.85	1.85	1.80
Beams, Chicago	2.00	2.00	2.00	2.00
Beams, New York	2.14½	2.14½	2.14½	2.04
Steel hoops, Pittsburgh	2.20	2.20	2.20	2.30

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Sheets, Nails and Wire,	July 2, 1928	June 26, 1928	June 5, 1928	July 5, 1927
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Sheets, black, No. 24, Pittsburgh	2.65	2.65	2.65	3.00
Sheets, black, No. 24, Chicago dist. mill	2.75	2.75	2.80	3.10
Sheets, galv., No. 24, Pittsburgh	3.50	3.50	3.50	3.85
Sheets, galv. No. 24, Chicago dist. mill	3.60	3.60	3.70	3.95
Sheets, blue, 9 & 10, Pittsburgh	2.00	2.00	2.00	2.25
Sheets, blue, 9 & 10, Chicago dist. mill	2.10	2.10	2.10	2.35
Wire nails, Pittsburgh	2.55	2.55	2.55	2.50
Wire nails, Chicago dist. mill	2.60	2.60	2.70	2.55
Plain wire, Pittsburgh	2.50	2.50	2.50	2.40
Plain wire, Chicago dist. mill	2.55	2.55	2.55	2.45
Barbed wire, galv., Pittsburgh	3.35	3.35	3.35	3.20
Barbed wire, galv., Chicago dist. mill	3.40	3.40	3.40	3.25
Tin plate, 100 lb. box, P'gh	$5.25	$5.25	$5.25	$5.50
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	*$17.00*	14.25	14.75	14.75
Heavy melting steel, Phila	13.00	13.00	13.50	14.00
Heavy melting steel, Ch'go	*12.25*	12.50	12.75	12.00
Carwheels, Chicago	13.00	13.00	13.25	13.50
Carwheels, Philadelphia	15.50	15.50	15.50	15.00
No. 1 cast, Pittsburgh	14.25	14.25	14.25	15.00
No. 1 cast, Philadelphia	*15.50*	16.00	16.00	16.00
No. 1 cast, Ch'go (net ton)	13.50	13.50	14.00	14.50
No. 1 RR. wrot. Phila	13.50	13.50	15.00	16.00
No. 1 RR. wrot. Ch'go (net)	11.00	11.00	11.50	11.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.60	$2.60	$2.60	$3.00
Foundry coke, prompt	3.75	3.75	3.75	4.00
Metals,				
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York	14.87½	14.87½	14.87½	12.62½
Electrolytic copper, refinery	14.50	14.50	14.50	12.25
Zinc, St. Louis	**6.20**	6.15	6.12½	6.15
Zinc, New York	**6.55**	6.50	6.47½	6.50
Lead, St. Louis	6.15	6.15	6.17½	6.02½
Lead, New York	6.30	6.30	6.30	6.30
Tin (Straits), New York	*46.12½*	46.25	49.25	64.50
Antimony (Asiatic), N. Y.	9.62½	9.62½	10.50	12.00

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Steel Business Holds Up Better Than Usual at This Time of Year—Large Pipe Line Orders

PITTSBURGH, July 2.--The slowing down in the steel industry common to Fourth of July week is in plant operations rather than in demand. Few steel makers yet detect the recession in consumptive requirements usual at this time of the year, the vital difference between the opening of the second quarter and the start of this quarter being that order books run lighter in contracts and heavier in specified tonnage, and the latter is much the more satisfactory condition so long as consumption holds up. A frequent expression as to the state of trade is that it is much better than it ordinarily is at this time of the year. Tin plate has never given a better account of itself than it is doing just now and additional pipe line orders have brought the total placed in the past two weeks to more than 200,000 tons. Locally, structural steel business does not reach sizable proportions, but in the country at large it is highly satisfactory.

In spite of the introduction of new models and the cessation of production of old models by several automobile builders, the demand for steel from that direction is holding up remarkably well. Last month surprised manufacturers of most finished steel products in the volume of the production and shipments of cars.

There is little new as to prices, except that sheets appear to have reached bottom and that makers of bars, plates and shapes are more earnest in their endeavors to establish 1.90c., base Pittsburgh, as the third quarter contract price.

Primary materials still are weak. It is several years since heavy melting steel scrap was priced as low as it has been sold in the past week. The pig iron market is inactive. Coal is very dull and prices are of buyers' making, since producers lacking Lake cargo business are finding it difficult to market their outputs. Cheap raw materials are somewhat of a drag on steel prices.

Pig Iron.—Interest in the market on the part of melters is limited, and the business of the past week has not amounted to much. The Westinghouse Electric & Mfg. Co. is still taking bids against its inquiry for last half requirements of its local and Cleveland foundries. The tonnage wanted is not specified, but it is assumed it will be of fair size and it is the only important business now pending. Small lots of foundry iron are moving. Some producers report sales at $17, Valley furnace, for the base grade, but as others are taking business at $16.75 and have gone as low as $16.50 in competitive territory, it is assumed that $17 prevails only at destinations to which the freight rate is lower than that into the Pittsburgh district. Important users of basic iron appear to be covered against their immediate requirements and interest in Bessemer and malleable iron is small. Low phosphorus iron is selling fairly well at around $28.25, delivered. W. P. Snyder & Co. make the average price of basic iron from Valley furnaces in June as $15.43,

compared with $16.25 in May, and of Bessemer $17, compared with $17.29 the month before.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$16.00
Bessemer	17.00
Gray forge	$16.25 to 16.50
No. 2 foundry	16.75
No. 3 foundry	16.25 to 16.50
Malleable	17.00
Low phos., copper free	26.50

Freight rate to Pittsburgh or Cleveland district, $1.76.

Ferroalloys. — Ferromanganese is firmly held at $105, Atlantic seaboard, for both the domestic and the imported product, but almost all of the recent shipments to consumers and those that they will receive this month carry a price of $100. Small consumers who depend upon the spot market have paid the present price, but users who were under contract for the first half of the year had until last Saturday to specify against them and have at least this month's coverage at the lower figure. Consumers of spiegeleisen are specifying well against contract commitments, and shipments of ferrosilicon are in fair volume.

Semi-Finished Steel.—To get orders for sheet bars makers here now find it necessary to make a price of $32, f.o.b. Pittsburgh, as an outside producer is supplying a Pittsburgh district mill which has a freight rate of a little more than $1 a ton from Pittsburgh, at $33, delivered. Some makers still ask more, but at this juncture sales at more than $32, f.o.b. Pittsburgh, are difficult, and it is probable that third quarter contracts will carry that price, which represents a drop of $2 a ton from the open, although flexible, quotation of the first half of the year. Billets and slabs are fairly firm, with makers disposed to resist the pressure of buyers against prices. On wire rods, $42, base Pittsburgh, appears to be all that can be done. Forging quality billets and blooms are selling at $38, base.

Bars, Plates and Shapes.—Makers in this area seem to be more determined in their adherence to 1.90c., Pittsburgh, as the basis of third quarter contracts, but buyers are in no hurry to close for that period and a test of that price awaits some show of interest in supplies on their part. Cold-finished bar makers are not busy and appear to have good-sized stocks of hot-rolled bars, and much the same situation exists among bolt, nut and rivet makers. In view of the recent decline of $2 a ton on cold-finished bars, there is some disposition on the part of other bar buyers to hold off to see whether the mills will insist on 1.90c. for hot-rolled bars. Much of the fabricated steel business in this area is in small projects. Plate prospects are brightened by a considerable tonnage of large outside-diameter pipe that is before the market, but they would be even brighter if there were signs of more railroad car business.

Rails and Track Supplies.—Leading makers have announced an extra of 25c. per 100 lb. for less than carload lots of both large and small spikes, with the shipment rather than the size of the order to govern. General business in rails and track supplies remains quiet.

Wire Products.—While total shipments of wire products for the first half of the year have been appreciably larger than in that period last year, the showing of June was unfavorable compared with June, 1927. The explanation is in the fact that, as the spring was backward and excessive rain followed it, the movement of goods into consumption, notably in the agricultural sections, has been limited. That, coupled with the heavy stocks accumulated to escape price advances, has left distributers with rather sizable supplies. Nails are commonly selling at $2.55, base per keg, Pittsburgh, and plain wire at $2.50, base per 100 lb., but there is some resistance to the latter price.

Tubular Goods.—Another good-sized line-pipe order has come to a Pittsburgh maker, this being one for 500 miles of 10-in. pipe, believed to be for the Atlantic Refining Pipe Lines Co., to run from Midland, Tex., to Atreco, the Gulf port of the Atlantic Refining Co. The purchase covers approximately 50,000 tons and makes a total of 100,000 tons that has been placed with local makers in the past two weeks. A Youngstown maker will furnish 300 miles of 16-in., approximately 42,000 tons, for a Louisiana gas line and the same producer is reported to have taken 136 miles of 20-in. for the gas line for the Inland Gas Corporation, an interest of the American Rolling Mill Co., which is to pipe natural gas from the Kentucky field to the Ashland, Ky., plant of the letter. Buttwelded pipe for building and construction work is moving steadily, but not much activity is seen in lapwelded pipe for oil well development, although the demand from the Seminole field is said to be a little more active.

Tin Plate. — Observance of the Fourth of July will mean a reduction of mill operating schedules this week by as much as one-third; the day is a regular steel mill holiday and most manufacturers are dropping one turn on July 3 and on July 5, besides the three on the holiday itself. All makers are well supplied with specifications on contracts but can afford a breathing spell in output, since the rainy weather is holding the crops back and the pack is also being retarded. The sale of bottled beverages also has been restricted by the weather, and this affects the use of caps, which are made of tin plate.

Cold-Finished Steel Bars and Shafting.—Business has not been helped by the recent reduction of $2 a ton in prices; rather, it has made buyers a little more conservative, because there were no signs of real weakness prior to the cut.

Hot-Rolled Flats. — Business in strips is good enough, but the price situation remains very unsatisfactory, with what are regarded as regular quotations applying only on small-lot business. Net prices continue to be made on the sizable tonnages and, translated back to a base price, produce very low figures. The extras over base evidently are profitable on

The Iron Age Composite Prices

Finished Steel

July 1, 1928, 2.341c. a Lb.

One week ago	2.341c.
One month ago	2.341c.
One year ago	2.367c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products constitute 87 per cent of the United States output of finished steel.

	High		Low	
1928	2.364c.,	Feb. 14;	2.314c.,	Jan. 3
1927	2.453c.,	Jan. 4;	2.293c.,	Oct. 25
1926	2.453c.,	Jan. 5;	2.403c.,	May 18
1925	2.560c.,	Jan. 6;	2.396c.,	Aug. 18
1924	2.789c.,	Jan. 15;	2.460c.,	Oct. 14
1923	2.824c.,	Apr. 24;	2.446c.,	Jan. 2

Pig Iron

July 1, 1928, $17.25 a Gross Ton

One week ago	$17.21
One month ago	17.23
One year ago	18.71
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High		Low	
1928	$17.75,	Feb. 14;	$17.21,	June 26
1927	19.71,	Jan. 4;	17.54,	Nov. 1
1926	21.54,	Jan. 5;	19.46,	July 13
1925	22.50,	Jan. 13;	18.96,	July 7
1924	22.88,	Feb. 26;	19.21,	Nov. 3
1923	30.86,	Mar. 20;	20.77,	Nov. 20

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base Per Lb.
F.o.b. Pittsburgh mill	1.85c. to 1.90c.
F.o.b. Chicago	2.00c.
Del'd Philadelphia	2.17c. to 2.22c.
Del'd New York	2.19c. to 2.24c.
Del'd Cleveland	2.04c. to 2.09c.
F.o.b. Cleveland	1.85c.
F.o.b. Lackawanna	1.95c.
F.o.b. Birmingham	2.05c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c. to 2.40c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills	1.95c. to 2.00c.
F.o.b. Birmingham	2.00c. to 2.15c.

Rail Steel

F.o.b. mills east of Chicago district	1.75c.
F.o.b. Chicago Heights mill	1.85c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base Per Lb.
F.o.b. Pittsburgh mills	1.85c. to 1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
Del'd Cleveland	2.04c. to 2.09c.
Del'd Philadelphia	2.10c. to 2.15c.
F.o.b. Coatesville	2.00c. to 2.05c.
F.o.b. Sparrows Point	2.00c.
F.o.b. Lackawanna	1.95c.
Del'd New York	2.17½c. to 2.22½c.
C.i.f. Pacific ports	2.25c. to 2.30c.

Structural Shapes

	Base Per Lb.
F.o.b. Pittsburgh mills	1.85c. to 1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
F.o.b. Lackawanna	1.95c.
F.o.b. Bethlehem	2.00c.
Del'd Cleveland	2.04c. to 2.09c.
Del'd Philadelphia	2.06c. to 2.18c.
Del'd New York	2.14½c. to 2.19½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Flats (Hoops, Bands and Strips)

	Base Per Lb.
Narrower than 3 in., P'gh	2.20c. to 2.30c.
From 3 in. to 6 in., P'gh	1.85c. to 2.10c.
6 in. and wider, P'gh	*1.75c. to 1.90c.
Narrower than 3 in., Chicago	2.30c.
From 3 to 6 in., Chicago	2.20c.
6 in. and wider, Chicago	2.00c.

Cotton ties, f.o.b. Atlantic and Gulf ports:

Carlots per 45-lb. bundle	$1.27
2000 bundle lots	1.25
Larger lots	1.23

*Mills follow plate or sheet prices according to gage on wider than 12 in.

Cold-Finished Steel

	Base Per Lb.
Bars, f.o.b. Pittsburgh mills	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.15c.
Shafting, ground, f.o.b. mill	*2.45c. to 2.90c.
Strips, 1 up to 3 tons, P'gh	3.00c. to 3.15c.
Strips, 1 up to 3 tons, Cleveland	2.90c. to 3.00c.
Strips, 1 up to 3 tons, del'd Chicago	3.30c. to 3.45c.
Strips, 1 up to 3 tons, Worcester	3.15c. to 3.30c.
Fender stock, Pittsburgh	4.10c.

*According to size.

Wire Products

(To jobbers in car lots, f.o.b. Pittsburgh and Cleveland)

	Base Per Keg
Wire nails	$2.55 to $2.65
Galvanized nails	4.55 to 4.65
Galvanized staples	3.25 to 3.35
Polished staples	3.00 to 3.10
Cement coated nails	2.55 to 2.65

	Base Per 100 Lb.
Bright plain wire, No. 9 gage	$2.50
Annealed fence wire	2.65
Spring wire	3.50
Galv'd wire, No. 9	3.10
Barbed wire, galv'd	3.35
Barbed wire, painted	3.10

Chicago district mill and delivered Chicago prices are $1 per ton above the foregoing. Birmingham mill prices $3 a ton higher; Worcester, Mass., (wire) mill $3 a ton higher on production of that plant; Duluth, Minn., mill $2 a ton higher; Anderson, Ind., $1 higher.

Woven Wire Fence

	Base to Retailers Per Net Ton
F.o.b. Pittsburgh	$65.00
F.o.b. Cleveland	65.00
F.o.b. Anderson, Ind.	66.00
F.o.b. Chicago district mills	67.00
F.o.b. Duluth	68.00
F.o.b. Birmingham	68.00

Sheets

Blue Annealed

	Base Per Lb.
Nos. 9 and 10, f.o.b. P'gh	2.00c. to 2.10c.
Nos. 9 and 10, f.o.b. Chicago dist. mill	2.10c.
Nos. 9 and 10, del'd Cleveland	2.09c. to 2.19c.
Nos. 9 and 10, del'd Philadelphia	2.32c. to 2.42c.
Nos. 9 and 10, f.o.b. Birmingham	2.20c. to 2.25c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.65c. to 2.75c.
No. 24, f.o.b. Chicago dist. mill	2.75c.
No. 24, del'd Cleveland	2.79c. to 2.89c.
No. 24, del'd Philadelphia	2.97c. to 3.07c.
No. 24, f.o.b. Birmingham	3.00c. to 3.05c.

Metal Furniture Sheets

No. 24, f.o.b. Pittsburgh, A grade	3.85c. to 3.90c.
No. 24, f.o.b. Pittsburgh, B grade	3.65c. to 3.70c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.50c. to 3.60c.
No. 24, f.o.b. Chicago dist. mill	3.60c.
No. 24, del'd Cleveland	3.54c. to 3.69c.
No. 24, del'd Philadelphia	3.82c. to 3.92c.
No. 24, f.o.b. Birmingham	3.80c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.85c. to 2.90c.
No. 28, f.o.b. Chicago dist. mill	3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	4.00c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill primes	4.10c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(*F.o.b. Morgantown or Pittsburgh*)
(Per package, 20 x 28 in.)

8-lb. coating I.C.	$11.20
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.30
25-lb. coating I.C.	$16.70
30-lb. coating I.C.	17.75
40-lb. coating I.C.	19.85

Alloy Steel Bars

(F.o.b. maker's mill)
Alloy Quality Bar Base, 2.65c.

S.A.E. Series Numbers		Alloy Differential	Net Price 100 Lb. Bars
2000	(½% Nickel)	$0.25	$2.90
2100	(1½% Nickel)	0.55	3.20
2300	(3½% Nickel)	1.50	4.15
2500	(5% Nickel)	2.25	4.90
3100	Nickel Chromium	0.55	3.20
3200	Nickel Chromium	1.35	4.00
3300	Nickel Chromium	3.80	6.45
3400	Nickel Chromium	3.20	5.85
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50	3.15
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70	3.35
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05	3.70
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35	3.00
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45	3.10
5100	Chromium Spring Steel	0.20	2.85
6100	Chromium Vanadium Bars	1.20	3.85
6100	Chromium Vanadium Spring Steel	0.95	3.60
9250	Silicon Manganese Spring Steel	0.25	2.90
	Chromium Nickel Vanadium	1.50	4.15
	Carbon Vanadium	0.95	3.60

Above prices are for hot-rolled steel bars, forging quality. The ordinary differential for cold-drawn bars is 1c. per lb. higher. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis. For billets under 4 x 4 down to and including 2½ in. squares, the price is $5 a gross ton above the 4 x 4 billet price.

Slabs with sectional area of 16 in. or over carry the billet price; slabs with sectional area of 12 in. to 16 in. carry a $5 extra above the billet price and slabs with a sectional area under 12 in. carry the bar price.

Band sizes are 40c. per 100 lb. higher.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base Per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plates, steel	2.15
Angle bars	2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ to ⅜	+11	+39
¼ to ⅜	51	25½	½	22	2
½	56	42½	¾	28	11
¾	60	48½	1 to 1½	30	13
1 to 3	62	50½			

Lap Weld

2	55	43½	2	23	7
2½ to 6	59	47½	2½	26	11
7 and 8	56	43½	3 to 6	28	13
9 and 10	54	41½	7 to 12	26	11
11 and 12	53	40½			

Butt Weld, extra strong, plain ends

⅛	41	24½	¼ to ⅜	+19	+54
¼ to ⅜	47	30½	½	21	17
½	53	42½	¾	28	12
¾	58	47½	1 to 1½	30	14
1 to 1½	60	49½			
2 to 3	61	50½			

Lap Weld, extra strong, plain ends

2	53	42½	2	23	9
2½ to 4	57	46½	2½ to 4	29	15
4½ to 6	56	45½	4½ to 6	28	14
7 to 8	52	39½	7 to 8	21	7
9 and 10	45	32½	9 to 12	16	2
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Lap Welded Steel		Charcoal Iron	
2 to 2¼ in.	27	1½ in.	+18
2½ to 2¾ in.	37	1¾ to 1⅞ in.	+ 8
3 in.	40	2 to 2¼ in.	— 2
3¼ to 3¾ in.	42½	2½ to 3 in.	— 7
4 to 13 in.	46	3¼ to 4½ in.	— 9

Beyond the above base discounts, the following extra discounts are given:

Lap Weld Steel	Charcoal Iron
Under 5000 lb.	4 Fives	1 Ten
5000 lb. to 12,000 lb.	5 Fives	2 Tens
12,000 lb. to 21,000 lb.	6 Fives	2 Tens & 2½
21,000 lb. and over	7 Fives	2 Tens & 5

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	63	3 in.	48
1¼ to 1½ in.	55	3¼ to 3½ in.	50
1¾ in.	39	4 in.	53
2 to 2¼ in.	34	4½, 5 and 6 in.	45
2½ to 2¾ in.	42		

Hot Rolled

2 and 2¼ in.	40	3¼ and 3½ in.	56
2½ and 2¾ in.	48	4 in.	59
3 in.	54	4½, 5 and 6 in.	48

Less carloads, 4 points less. Add $8 per net ton for more than four gages heavier than standard. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage to be held at mechanical tubes list and discount. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40%, base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

the wider material, in view of the price cuts that are being made on stock 6 in. wide or wider. Hoops and bands are firmer in price than strips.

Cold-Rolled Strips.—Demand has fallen off much less than it usually does at this time of the year, and some makers find June orders ahead of those for May. Prices, however, are dominated by the hot-rolled strip market, and most business carries the minimum quotation of 3c., base, or 2.75c. for lots of 3 tons or more.

Fluorspar.—The larger domestic producers have announced an advance of $1 per ton in gravel spar to $17 per net ton at mines. The smaller producers have not acted, and such business as has been done lately has been at $16. Most users are covered for the next few months and not much new business is in sight, unless this advance prompts some buying.

Sheets.—Mill operating schedules are lower this week by as much as one-third, but it is the observance of the Fourth of July, one of the regular steel industry holidays, rather than a lack of business, that is responsible. There is no evidence yet of the recession in consumptive requirements common to this time of the year and orders, while individually small and for very prompt shipment, are quite numerous. Prices are steadier at least to the extent that they are no lower now than they were a week ago.

Bolts, Nuts and Rivets.—Buyers have been prompt in entering contracts for third quarter. Specifications are constant, but are kept well within actual requirements and a 50 per cent operation of productive capacity is sufficient to supply the demand.

Coke and Coal.—The market still is extremely dull. While a little Lake cargo coal business has developed, it is not nearly the size it was expected to be, and with demands from other directions also light, prices still are very much in the buyers' favor. There is only a limited demand for spot furnace coke and prices hold chiefly because offerings are light. So many foundries are under contract that interest in spot offering amounts to little.

Old Material.—Dealers are more anxious to book orders than melters are to place them and, while the market has been fairly active in the past week, it is largely because dealers have made prices that have induced consumers to take supplies. Two steel companies in this district have bought No. 1 heavy melting steel at $14, one of them getting at least 10,000 tons at that figure, which sets another new low mark for the year. Weakness in the lighter grades is unrelieved, with machine shop turnings still offered at $9 and blast furnace grades no longer quotable at more than $10. Heavy breakable cast scrap has been sold at $12. Compressed sheet scrap is not at all plentiful and is virtually at par in price with heavy melting steel.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
Heavy melting steel	$13.75 to $14.25
Scrap rails	13.75 to 14.00
Compressed sheet steel	13.50 to 14.00
Bundled sheets, sides and ends	13.00 to 13.50
Cast iron carwheels	14.00 to 14.50
Sheets bar crops, ordinary	14.00 to 14.50
Heavy breakable cast	12.00 to 12.50
No. 2 railroad wrought	14.00 to 14.25
Heavy steel axle turnings	12.50 to 13.00
Machine shop turnings	9.00
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	15.00 to 15.50
Railr. coil and leaf springs	15.00 to 15.50
Rolled steel wheels	15.00 to 15.50
Low phos. billet and bloom ends	19.00 to 19.50
Low phos., mill plate	17.50 to 18.00
Low phos., light grade	16.50 to 17.00
Low phos. sheet bar crops	17.50 to 18.00
Hvy. steel axle turnings	12.50 to 13.00
Electric Furnace Grades:	
Low phos. punchings	16.50 to 17.00
Hvy. steel axle turnings	12.50 to 13.00
Blast Furnace Grades:	
Short shov'l'g steel turnings	10.00
Short mixed borings and turnings	10.00
Cast iron borings	10.00
No. 2 busheling	8.50 to 9.00
Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
No. 1 railroad wrought	10.50 to 11.00
Sheet bar crops	16.00 to 16.50
Cupola Grades:	
No. 1 cast	14.25 to 14.50
Rails 3 ft. and under	15.50 to 16.00
Malleable Grades:	
Railroad	13.75 to 14.00
Industrial	13.25 to 13.50
Agricultural	12.75 to 13.00

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.60c.
Hoops	4.00c. to 4.50c.
Black sheets (No. 24), 25 or more bundles	3.55c.
Galv. sheets (No. 24), 25 or more bundles	4.40c.
Blue ann'l'd sheets (No. 10), 25 or more sheets	3.10c.
Galv. corrug. sheets (No. 28), per square	$4.31
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count,	60 per cent off list
Machine bolts, 100 count,	60 per cent off list
Carriage bolts, 100 count,	60 per cent off list
Nuts, all styles, 100 count,	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'l'd, base per 100 lb.	$3.00 to 3.10
Wire, galv. soft, base per 100 lb.	3.00 to 3.10
Common wire nails, per keg	3.00
Cement coated nails, per keg	3.05

Heavy Reduction in Pig Iron Imports

Imports of pig iron in May are reported by the Department of Commerce as 9732 gross tons. This is less than half the April figure of 20,845 tons and represents a reduction of nearly 44 per cent from the 16,664 tons of May, 1927.

In spite of this falling off, however, the total for the first five months, at 63,496 tons, is more than 35 per cent above the corresponding figure last year. The increase has been accounted for by a gain of more than 21,000 tons in receipts from Great Britain. India has sent a slightly larger tonnage, but shipments from Germany have fallen off to almost nothing and there has been a reduction in receipts from the Netherlands.

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT
(In Gross Tons)

	May	
	1928	1927
United Kingdom	4,556	3,600
British India	3,026	10,402
Germany	....	180
Netherlands	1,888	2,315
Canada	....	95
France	....	....
Belgium	....	....
Norway	41	....
All others	221	72
Total	9,732	16,664

Iron Ore Imports Hold Well

Imports of iron ore in May are reported by the Department of Commerce at 211,270 gross tons. This is more than 5½ per cent below the April imports of 224,841 tons but represents a gain of 30 per cent over the March arrival of 162,654 tons. It is 14 per cent higher than the incoming tonnage a year ago, at 186,208 tons in May.

For the first five months of the years imports have been about 3 per cent higher than last year. Heavy gains are reported in incoming tonnages from Chile, Canada and French Africa, while there was a sharp reduction in imports from Cuba and Sweden. More than half of the total for the five months in each year came from Chile. For May, 1928, Chile furnished more than two-thirds of the total.

SOURCES OF AMERICAN IMPORTS OF IRON ORE
(In Gross Tons)

	May	
	1928	1927
Canada	290	2,365
Cuba	33,000	48,000
Chile	141,800	101,500
Spain	....	....
Sweden	....	9,294
French Africa	34,375	25,025
Other countries	1,805	24
Total	211,270	186,208

Electric Power Production in United States in 1927

Production of electric power by public utility plants in the United States in 1927 is placed by the Geological Survey at 80,205,474,000 kwhr. Of this amount 50,336,466,000 was produced by the combustion of fuels and 29,875,008,000 by waterpower. Fuels produced 62.8 per cent of the total. Consumption of fuels included 41,888,497 net tons of coal, 6,782,192 bbl. of oil, 62,919,197,000 cu. ft. of natural gas, and a certain amount of wood and other combustibles.

There were 1820 operating companies in the United States, Jan. 1, 1928, having a total of 3740 plants and an aggregate generator capacity of 27,690,841 kw.

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

F.o.b. Pittsburgh or Youngstown

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and over	$32.00 to $33.00
Rerolling, under 4-in. to and including 1¾-in.	33.00 to 34.00
Forging, ordinary	38.00
Forging, guaranteed	43.00

Sheet Bars

	Per Gross Ton
Open-hearth or Bessemer	$32.00 to $33.00

Slabs

	Per Gross Ton
8 in. x 2 in. and larger	$32.00 to $33.00
Smaller than 8 in. x 2 in.	33.00 to 34.00

Skelp

	Per Lb.
Grooved	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.

Wire Rods

	Per Gross Ton
*Common soft, base	$42.00
Screw stock	$5.00 per ton over base

*Chicago mill base is $44 to $45. Cleveland mill base, $43 to $44.

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.55
Old range non-Bessemer, 51.50% iron	4.40
Mesabi Bessemer, 51.50% iron	4.40
Mesabi non-Bessemer, 51.50% iron	4.25
High phosphorus, 51.50% iron	4.15

Foreign Ore, c.i.f. Philadelphia or Baltimore

	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	10.00c.
Iron ore, Swedish, average 66% iron,	9.25c. to 9.50c.
Manganese ore, washed, 52% manganese, from the Caucasus	39c.
Manganese ore, Brazilian, African or Indian, basis 50%	38c. to 39c.
Tungsten ore, high grade, per unit, in 60% concentrates	$11.00 to $11.25

	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00

	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.60 to $2.75
Foundry, f.o.b. Connellsville prompt	3.50 to 4.25
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	9.00
Foundry by-prod., del'd St. Louis	9.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.40 to $1.80
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in., f.o.b. Pa. mines	2.00 to 2.10
Mine run gas coal, f.o.b. Pa. mines	1.75 to 1.90
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.05
Gas slack, f.o.b. W. Pa. mines	1.10 to 1.15

Ferromanganese

	Per Gross Ton
Domestic, 80%, furnace or seab'd	$105.00
Foreign, 80%, Atlantic or Gulf port, duty paid	105.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $32.00
Domestic, 16 to 19%	29.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50 to $88.50
75%	130.00 to 140.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
6%	$23.00	10%	$28.00
7%	24.00	11%	30.00
8%	25.00	12%	32.00
9%	26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal, del'd	95c.
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads	11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	$3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	$200.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	$91.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	$122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silica, gravel, f.o.b. Illinois and Kentucky mines	$16.00 to $17.00
No. 2 lump, Illinois and Kentucky mines	$20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$16.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	$32.50

Fire Clay

	Per 1000 f.o.b. Works First Quality	Second Quality
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	——
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	6.75c. to 6.50c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including ⅝ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	80, 10 and 2½
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in bulk, Pittsburgh	80, 10 and 5
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55 to 60 per cent apply.

Large Rivets

(½-In. and Larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00

Small Rivets

(7/16-In. and Smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 10
Milled standard set screws, case hardened,	80 and 10
Milled headless set screws, cut thread	80
Upset hex. head cap screws, U.S.S. thread,	85 and 5
Upset hex. cap screws, S.A.E. thread	85 and 5
Upset set screws	80, 10 and 10
Milled studs	70 and 5

Chicago

First Half Steel Shipments Largest in Many Years—Ingot Output Now at 80 Per Cent

CHICAGO, July 2.—Shipments of steel by Chicago producers in the first six months of this year totaled the largest for a like period in many years and exceeded the corresponding period of 1927 by 15 per cent. Following a dull November and December, orders bulked large in January, while March and May were record months. June shipments were not as heavy as those in May, and the tendency is still downward, though at a slower pace than is usually to be expected at this time of year. Ingot output, after dropping for three consecutive weeks, is now at 80 per cent of capacity. The general demand for heavy tonnage steel products is well sustained, and it therefore appears that the slower rate of ingot output is largely chargeable to dwindling shipments of rails.

Chicago producers are naming 2c. as the third quarter price on shapes, plates and bars. Although the practice of spot purchasing is more widespread than earlier in the year, there is an increasing interest in advance buying, and sales for the week are the fourth largest this year and exceed those of any seven-day period since the middle of February. Backlogs are heavier in practically all commodities except rails and sheets. Specifications are fully equal to shipments.

Bids have been submitted at Denver, Colo., on 12,000 tons of steel pipe.

No. 6 furnace has been put out at Gary, leaving 25 active steel works stacks out of 36 in the district.

Pig Iron.—Price levels to the east of Chicago are of interest to local buyers of pig iron, who are uncertain as to the general trend of business and the effect of neighboring markets on Chicago quotations. Shading of differentials on high silicon iron is being practised by a few sellers and distress lots of iron brought in by boat can be had at prices below the Chicago market level. A user in western Michigan has taken 700 tons of 8 per cent silvery at the market, A melter in Illinois will buy 100 tons of the 7 per cent grade. Bargain lots of charcoal iron are still to be had at well below the quoted price of $24, furnace.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$18.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	18.50
Malleable, not over 2.25 sil	18.00
High phosphorus	18.00
Lake Super. charcoal, sil. 1.50	27.04
So'th'n No. 2 fdy. (all rail)	21.51
So'th'n No. 2 (barge and rail)	21.01
Low phos., sil. 1 to 2, copper free	$28.50 to 29.00
Silvery, sil. 8 per cent	29.79
Bess. ferrosilicon, 14-15%	46.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Local dealers are using $33, Hazard, Pa., as the basis for quoting on 19 to 21 per cent spiegeleisen, but the market is slow and no sales have been made. Specifications for ferrosilicon and ferromanganese are of moderate size.

Prices delivered Chicago: 80 per cent ferromanganese, $112.56; 50 per cent ferrosilicon, $83.50 to $87.50; spiegeleisen, 19 to 21 per cent, $40.76.

Plates.—Following several weeks in which oil producers showed little interest in added storage facilities, there is now before the steel trade fully 14,000 tons of tank plates for three oil companies in the Southwest. In the local market both sales and deliveries of plates are of moderate size. Demand from the general manufacturing trade is steady, and fabricators are taking normal tonnages for this time of the year. But railroad car builders, who have not been forced to extend themselves since the turn of the year, are operating at less than 40 per cent of capacity on orders against which practically full specifications already have been entered at the mills. The outlook in the railroad equipment market is not promising. The Chicago & Eastern Illinois is asking for prices on 100 40-ft. automobile cars. This is essentially a revival of an old inquiry, which originally was for 500 cars. Word is being passed around that the Missouri-Kansas-Texas will place orders for 19 passenger and baggage cars next week. Action is still awaited on 10 air dump cars and 250 gondola bodies for the Rock Island. The price situation in this district has been somewhat clarified by the action of one producer in announcing 2c. per lb., base Chicago, as the basis for third quarter contracts and spot orders. That there is still some doubt as to the course to follow is indicated by the fact that other sellers are delaying action until they are surer of the general trend. In the absence of heavy tonnage business, it is believed by some that 2c., Chicago, can be held for the time being.

Mill prices on plates, per lb.: 2c., base Chicago.

Structural Material.—A feature of this market is the tonnage required for bridge work, both for railroads and State highways. In addition to the large project announced a few days ago at Louisville, Ky., there is a railroad bridge at Melville, La., that will take 4200 tons. Orders have been placed for 1200 tons of steel for a bridge across the Missouri River, 1000 tons for a bridge at Menominee, Wis., and 500 tons for a span at Garland City, Ark. At Chicago, it is reported that 3500 tons for the Austin High School has been awarded and that 2200 tons has been placed for a motor car assembly plant at Kansas City, Mo. Some fabricators in Chicago are finding it advisable to increase their efforts to obtain contracts, though the situation here as a whole is quite favorable for this time of the year. Indiana shops are well supplied with work and the same is true to the southwest. In Nebraska, however, 70 per cent of shop capacity appears to be a fair estimate of output. Weather conditions in the last 10 days have not been favorable to outdoor construction and building programs have been set back. Prices for plain material are steady at 2c., Chicago. Open announcement of this quotation for third quarter business has been made by only one producer.

Mill prices on plain material, per lb.: 2c., base, Chicago.

Bolts, Nuts and Rivets.—Users of these commodities, having found stocks inadequate for early July consumption, are issuing larger specifications, and it now seems assured that production of bolts, nuts and rivets will be continued at close to 65 per cent of capacity. It is noteworthy that railroads are in need of larger quantities.

Reinforcing Bars.—Large tonnages of rail steel bars are quoted at 2c. per lb., and billet concrete bars bring 2.30c., Chicago warehouse. Small lettings are numerous, and, because of the extra amount of labor needed to complete them, shops have an air of activity that is not reflected in the volume of shipments. The Harmon Sports Arena, Chicago, requiring 450 tons of bars, is out for figures, and an old project, Sheridan Towers apartment building, Chicago, in which 450 tons will be used, has been revived and final action may be taken on the contract in a few days. Contracts and fresh inquiries are given on page 59.

Bars.—Improvement is noted in the demand for soft steel bars from miscellaneous sources. Deliveries run from three to four weeks, depending on the range of sizes in individual orders and rolling schedules at mills. Accessory manufacturers who cater to the automobile industry have not diminished their pace and forgers are busy. Agricultural implement manufacturers, having passed the inventory period, have swung into full production, with sizable schedules arranged for many weeks to come. Mild steel bar output is well above the current ingot rate, which stands close to 80 per cent of capacity. Prices in Chicago are 2c. per lb., and some forward contracting has been done at that figure. For the third consecutive week new business and specifications for iron bars have been well above the average week so far this year. Much of this tonnage comes from miscellaneous sources. Prices are steady at 2c., Chicago. Though reports are current that several manufacturers of automobiles have cut output, they are evidently builders who do not depend on this district for steel. In alloy steel bars, shipments and new orders for the past week compare favorably with the average over the last month. Buyers of rail steel bars are taking smaller quantities and are demanding prompt shipment. New buying is in fair total

volume but does not equal mill output, which is at capacity. Stocks in the hands of producers are unbalanced and small, following a heavy run on steel fence posts and hard steel reinforcing bars. Prices are steady at 1.85c., Chicago Heights.

Mill prices per lb.: Soft steel bars, 2c., base, Chicago; common bar iron, 2c., base, Chicago; rail steel bars, 1.85c., base, Chicago Heights mill.

Wire Products.—Demand is remarkably steady when it is considered that the seventh month of the year is at hand. Trade from manufacturing consumers is well sustained, and mill operations remain close to 65 per cent of capacity. Orders placed by the railroads are of fair size, having varied little in many weeks. Demand for field fencing in rural districts is lighter. Jobbers in the South are finding business quiet. Distributers in the Middle West report a steady demand, and trade in the Northwest is much improved. Although rains have improved the crop outlook in some parts of the country, in some sections an excess of water is interfering with cultivation of the fields. Mill prices for wire and wire products are given on page 43.

Rails and Track Supplies.—Outstanding among track supply orders this week is one placed by the Pennsylvania Railroad. In all, 12,000 tons was purchased by that line, though it is not known here how the tonnage was distributed. Miscellaneous orders from Western railroads total 5000 tons. Shipments of track accessories are steady, and the rate of production has not changed for over four weeks. The heavy-section rail market is quiet. Rail output is close to 75 per cent of mill capacity. Several carload orders for light rails have been placed.

Prices f.o.b. mill, per gross ton: Standard-section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.25c.; angle bars, 2.75c.

Coke.—Shipments of by-product foundry coke are a trifle lighter, reflecting the slower operations of foundries in this district. Second half contracting has gone forward steadily and prices are firm.

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	2.30c. to 3.00c.
Reinforc'g bars, hard steel	2.00c. to 2.70c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands	3.65c.
Hoops	4.15c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.65c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, stand. railroad	3.55c.
Track bolts	4.55c.
Rivets, structural	3.60c.
Rivets, boiler	3.60c.

	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.30
Com. wire nails, base per keg	3.10
Cement c't'd nails, base per keg	3.10

Old Material.—A consumer has purchased close to 1000 tons of No. 1 railroad heavy melting steel at $12.75 a gross ton, delivered, a figure 25c. below the last purchase. Taken as a whole, this market is dragging and the trade is bearish. A few specialties are scarce and firm in price, but, for the most part, the supply of scrap is fully equal to, or even greater than, consumption. Larger buyers have fair stocks on hand and are well protected by contracts. The reaction in the market has brought prices obtained by railroads to the lowest point in months. The trade has sized up the slackening rate of steel production as an indication of dullness in the scrap market during the summer months.

Prices deliv'd consumers' yards, Chicago:

	Per Gross Ton	
Basic Open-Hearth Grades:		
Heavy melting steel	$12.25 to	$12.75
Shoveling steel	12.25 to	12.75
Frogs, switches and guards, cut apart, and misc. rails	13.25 to	13.75
Hydraul. compressed sheets	11.00 to	11.50
Drop forge flashings	9.50 to	10.00
Forg'd, cast and r'l'd steel carwheels	15.25 to	15.75
Railr'd tires, charg. box size	15.50 to	16.00
Railr'd leaf springs, cut apart	15.50 to	16.00
Acid Open-Hearth Grades:		
Steel couplers and knuckles	13.75 to	14.25
Coil springs	15.75 to	16.25
Electric Furnace Grades:		
Axle turnings	12.50 to	13.00
Low phos. punchings	14.50 to	15.00
Low phos. plate, 12 in. and under	14.00 to	14.50
Blast Furnace Grades:		
Axle turnings	9.50 to	10.00
Cast iron borings	9.00 to	9.50
Short shoveling turnings	9.00 to	9.50
Machine shop turnings	6.25 to	6.75
Rolling Mill Grades:		
Iron rails	13.50 to	14.00
Rerolling rails	14.75 to	15.25
Cupola Grades:		
Steel rails less than 3 ft.	15.50 to	16.00
Angle bars, steel	14.25 to	14.75
Cast iron carwheels	13.00 to	13.50
Malleable Grades:		
Railroad	12.50 to	13.00
Agricultural	11.50 to	12.00
Miscellaneous:		
*Relay'g rails, 56 to 60 lb.	23.00 to	25.00
*Relay'g rails, 65 lb. and heav.	26.00 to	31.00
	Per Net Ton	
Rolling Mill Grades:		
Iron angles and splice bars	14.00 to	14.50
Iron arch bars and transoms	19.50 to	20.00
Iron car axles	23.50 to	24.00
Steel car axles	15.50 to	16.00
No. 1 railroad wrought	11.00 to	11.50
No. 2 railroad wrought	11.00 to	11.50
No. 1 busheling	9.50 to	10.00
No. 2 busheling	5.75 to	6.25
Locomotive tires, smooth	12.00 to	12.50
Pipes and flues	8.00 to	8.50
Cupola Grades:		
No. 1 machinery cast	13.50 to	14.00
No. 1 railroad cast	13.00 to	13.50
No. 1 agricultural cast	12.50 to	13.00
Stove plate	11.00 to	11.50
Grate bars	11.25 to	11.75
Brake shoes	10.50 to	11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Cast Iron Pipe.—The Santa Fe Railroad is reported to have placed 650 tons of 10-in. pipe for delivery at Galesburg, Ill. At Chicago, two bidders quoted $40, delivered, or $31.80. Birmingham, on 1620 tons of 6 and 8-in. Class B pipe. The Allied Contractors, Chicago, have taken a general contract at Winfield, Ill., calling for about 400 tons of 6 and 8-in. Class B pipe. Morton Grove, Ill., has placed 1000 tons of 6 and 8-in. pipe through a contractor. Orders this week have been in fair volume, but fresh inquiry is sluggish. Rainy weather is interfering with pipe laying and contractors are less anxious for deliveries. Several pipe foundries will close next week for repairs. Prices are firm at $32 to $33, Birmingham, for 6-in. diameters and larger.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $40.20 to $41.20; 4-in., $44.20 to $45.20; Class A and gas pipe, $4 extra.

Sheets.—Users continue to take sheets in small lots. New sales are light and, therefore, do not relieve the stress at mills in arranging rolling schedules. One group of hot mills in Chicago will be idle all next week, and production at Milwaukee will be halted for the coming seven days. Believing that stocks in the hands of users are running low, producers now look forward to the end of July as about the time when demand will turn upward. Light tank makers are less busy, and the roofing trade is taking a smaller tonnage. Base prices at Chicago district mills are weak at 3.60c. for galvanized, 2.75c. for black and 2.10c. for blue annealed sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.80c.; No. 24 galv., 3.65c.; No. 10 blue ann'l'd, 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary plus the mill prices, which are 5c. per 100 lb. lower than Chgo. deliv'd prices.

Northern and Southern Cast Iron Pipe Makers Combined

James B. Clow & Sons, Chicago, have purchased a controlling interest in the National Cast Iron Pipe Co., Birmingham. Both companies produce cast iron pipe. Each will retain its present name and the officers and organization of both will remain intact.

E. E. Linthicum, president and founder of the National company, will continue in that capacity. A change in the board of directors, to give the new owners proper representation, will be made. Paul A. Ivy will go with the National company as vice-president.

James B. Clow & Sons have been in business since 1878. Their pipe plants are located at Newcomerstown and Coshocton, Ohio, and their main offices are in Chicago, where they also conduct one of the largest plants in the country for the manufacture and distribution of plumbing and heating supplies.

Steel & Tubes, Inc., Cleveland, has engaged the Sessions Engineering Co., Chicago and Detroit, to prepare plans and specifications and supervise the construction of its new welded steel tubing plant to be erected at Ferndale, Mich., a Detroit suburb. Construction will start Aug. 1 and it is expected that the plant will be completed by Jan. 1.

New York

Pipe Order for 50,000 Tons Placed by Texas Co.—Price Uncertainty in Steel

NEW YORK, July 2.—Pig iron sales have been adversely affected by inventory-taking and totaled only 6000 tons for the week. Shipments, however, have not been held up as much as usual, indicating that foundries have little iron in stock and will need additional metal as soon as they resume operations. An improvement in orders for castings is rather generally reported, particularly among jobbing foundries, whose business has been of a spotty character since the first of the year. The General Electric Co. is inquiring for 500 tons of high-silicon malleable pig iron for Schenectady and is reported to have placed 150 tons of low phosphorus for the same plant. The Worthington Pump & Machinery Corporation has closed for 445 tons of foundry for its Holyoke, Mass., plant and 40 tons for Harrison, N. J. New inquiries in this district, most of them small, total about 2500 tons. In addition, a Massachusetts melter is in the market for 1200 tons of foundry iron. The price situation is virtually unchanged, with Buffalo foundry iron ranging from $16 to $17, base furnace, and eastern Pennsylvania foundry from $19.50 to $20, base furnace.

Prices per gross ton, deliv'd New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$20.91 to $21.91
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	20.89 to 22.52
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	21.39 to 23.02
East. Pa. No. 1X fdy., sil. 2.75 to 3.25	21.89 to 23.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.

Ferroalloys.—An inquiry from the Ford Motor Co. for 1000 tons of ferromanganese for delivery in the third quarter has appeared, but otherwise business before the market is confined to carload and small lots. Prices are unchanged at $105, seaboard. The spiegeleisen market is firm at $33 for the high-grade alloy. There has been a fair business in carload and small lots.

Plates, Shapes and Bars.—Uncertainty as to prices exists, notwithstanding recent announcements by mills that 2.05c., Coatesville on plates, 2.05c., Bethlehem, on shapes, and 1.90c., Pittsburgh, on bars, would be the ruling third quarter quotations. These prices have not been established, except on a few minor transactions, though a good many contract buyers have signed up for third quarter at the new levels. Specifications against these contracts probably will not be received in any great number for a few weeks, and price developments in the interim will be watched closely by both sellers and consumers. The fact that many contract buyers did not exercise in full their second quarter options at prices $1 a ton below the level announced for this quarter may indicate either a decline in consumption or lack of confidence in price stability. On plates spotty weakness has developed. Although most of the sales are at 2.17½c., delivered New York, concessions of $1 a ton have been given on desirable orders. A Pittsburgh price of 1.80c., equal to 2.14c., delivered New York, also has appeared in some instances. Quotations received last Friday by the New York Central Railroad on its third quarter requirements disclosed a variety of price ideas. On plates the low Eastern quotation was 1.85c., Newberry Junction, submitted by the Central Iron & Steel Co., Harrisburg, Pa. The Lukens Steel Co., which three months ago quoted 1.85c., same delivery point, put in a price of 1.90c., Newberry Junction. The Carnegie Steel Co. bid 1.90c., Youngstown, or 2.03c., West Seneca, N. Y., on the three commodities; Youngstown Sheet & Tube Co., 1.90c., Youngstown; Jones & Laughlin Steel Corporation, 1.90c., Youngstown, or 2c., Buffalo; Bethlehem Steel Co., 1.90c., West Seneca; Otis Steel Co., 1.85c., Cleveland, on plates; Granite City Steel Co., 1.85c., Granite City, Ill., on plates; Alan Wood Iron & Steel Co., 2.18½c., Newberry Junction, on plates. Chicago bids were 2.10c., Chicago, by the Illinois Steel Co. and 2c., Indiana Harbor, by the Inland Steel Co. Many large structural projects involving substantial tonnages are under negotiation and probably will be awarded during the summer. Among those not previously reported are an office building for the American Exchange-Irving Trust Co. at 1 Wall Street and a garment manufacturing building on Seventh Avenue, each of which will take about 10,000 tons. A high school building in Brooklyn calls for 3500 tons.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.19c. to 2.24c.; plates, 2.12½c. to 2.22½c.; struct. shapes, 2.14½c. to 2.19½c.; bar iron, 2.14c.

Pipe.—The Texas Co., New York, has given an order for 50,000 tons of steel pipe to the Youngstown Sheet & Tube Co., for a pipe line in Texas. This is a portion of a large pipe line project which the Texas Co. has under way. A recent contract for about 25,000 tons was awarded to the A. O. Smith Corporation, Milwaukee, for fabrication.

Sheets and Strips.—Weakness continues in sheets, but prices are no lower. The galvanized product is quite freely obtainable at 3.50c. or less, Pittsburgh, while on black sheets the open market price is 2.65c., Pittsburgh. Sales of blue annealed sheets are still commonly made at 2c., Pittsburgh, but the extra of 10c. per 100 lb. on widths exceeding 40 in. is frequently waived on desirable orders. On cold-rolled strip steel, concessions of $1 a ton have been given by some mills on orders of fair size, thus making the market range 2.70c. to 2.75c., Pittsburgh, for lots or 3 tons or more. On hot-rolled strips concessions of $1 a ton have not been infrequent. Quotations on the black sheet requirements of the New York Central Railroad, opened last Friday, ranged from 2.65c., Niles, Ohio, mill, put in by the Mahoning Valley Steel Co. to 3.05c., Newberry Junction, the bid of Bethlehem Steel Co. Blue annealed quotations covered a wide range, from 1.99c., Youngstown, bid by the Sheet

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.50c.
Bands	4.00c.
Blue ann'l'd sheets (No. 10)	3.85c. to 3.90c.
Long terne sheets (No. 24)	5.60c. to 5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, 1½ x ½ in. and larger	3.30c.
Smooth finish, 1 to 2½ x ¼ in. and larger	3.65c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut thread:	
¾ x 6 in. and smaller	55 to 60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	55 to 60
¾ x 20 in. and smaller	50 to 50 and 10
Coach screws:	
½ x 6 in. and smaller	55 to 60
1 x 16 in. and smaller	50 to 50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discount on Welded Pipe

Standard Steel—	Back	Galv.
½-in. butt	46	29
¾-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
½-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 *x* 20 *in.*)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 *x* 20 *in.*)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.60c. to 3.80c.
No. 22	3.75c. to 3.95c.
No. 24	3.80c. to 4.00c.
No. 26	3.90c. to 4.10c.
No. 28*	4.05c. to 4.25c.
No. 30	4.30c. to 4.50c.

Sheets, Galvanized

	Per Lb.
No. 14	4.15c. to 4.35c.
No. 16	4.00c. to 4.20c.
No. 18	4.15c. to 4.35c.
No. 20	4.30c. to 4.50c.
No. 22	4.35c. to 4.55c.
No. 24	4.50c. to 4.70c.
No. 26	4.75c. to 4.95c.
No. 28*	5.00c. to 5.20c.
No. 30	5.40c. to 5.60c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

Metal Mfg. Co., to 2.38½c., Newberry Junction, put in by the Alan Wood Iron & Steel Co. The Otis Steel Co. quoted 2c., Cleveland, and the Youngstown Sheet & Tube Co. and the Sharon Steel Hoop Co. both bid 2c., Youngstown.

Cast Iron Pipe.—The market has been slightly more active in the past week, but business is still rather dull and buying is confined mostly to small lots, principally by private users. Southern makers continue to quote $32 to $33, Birmingham, while Northern foundries seem to be adhering to a range of $37.60 to $38.60, delivered New York. The Warren Foundry & Pipe Co. is low bidder on 300 tons of 8-in. and 12-in. water pipe for the city of New York, and the United States Cast Iron Pipe & Foundry Co. is low on 500 tons for 12-in., class C pipe for Yonkers, N. Y. Bloomfield, N. J., opened bids on July 2 for a small tonnage of pipe and fittings.

Prices per net ton, deliv'd New York: Water pipe 6-in. and larger, $37.60 to $38.60; 4-in. and 5-in., $42.60 to $43.60; 3-in., $52.60 to $53.60; Class A and gas pipe, $4 to $5 extra.

Warehouse Business.—June business was slightly smaller than that of May with most jobbers in this district. Black and galvanized sheet prices still show weakness, but 3.80c. to 4c. per lb., base, on black and 4.50c. to 4.70c., base, on galvanized are representative of the market.

Old Material.—Buying prices are substantially unchanged, but an undertone of weakness continues in most grades. No. 1 heavy melting steel is being bought at $12.50 per ton, delivered, and blast furnace scrap at $9 to $9.50 per ton, delivered. These are the most active grades, except for some purchasing of yard grade of heavy melting steel at $10 to $10.50 per ton, delivered to Harrisburg, Pottsville and Conshohocken, Pa.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel.	$9.50 to $9.85
Heavy melting steel (yard)	6.25 to 7.00
No. 1 hvy. breakable cast.	11.00 to 12.00
Stove plate (steel works)..	7.00 to 7.25
Locomotive grate bars...	7.00 to 7.50
Machine shop turnings...	6.00 to 6.50
Short shoveling turnings..	6.00 to 6.50
Cast borings (blast furn. or steel works).....	6.00 to 6.50
Mixed borings and turnings	6.00 to 6.50
Steel car axles.....	14.50 to 15.00
Iron car axles.....	23.75 to 24.75
Iron and steel pipe (1 in. dia., not under 2 ft. long)	8.25
Forge fire.....	6.50 to 6.75
No. 1 railroad wrought....	9.50 to 10.00
No. 1 yard wrot., long....	8.00 to 8.50
Rails for rolling.....	10.00 to 10.50
Cast iron carwheels.....	11.00 to 11.50
Stove plate (foundry)....	8.50 to 9.00
Malleable cast (railroad)..	10.00
Cast borings (chemical)..	10.75 to 11.25

Prices per gross ton, deliv'd local foundries:

No. 1 machy. cast.....	$14.00 to $15.00
No. 1 hvy. cast (columns bldg. materials, etc.), cupola size.....	12.00 to 13.00
No. 2 cast (radiators, cast boilers, etc.).....	11.50 to 12.50

Reinforcing Bars.—About 700 tons of bars is to be purchased this week by Rodgers & Hagerty, Inc., general contractor for a section of the New York subway. A considerable tonnage will be needed for the Samuel Tilden High School in Brooklyn, for which estimates are being prepared. The volume of small orders is keeping up at a good rate, and although the total business placed during the first half of the year was not up to the expectations of most of the distributers, prospects for the summer months are good. The mill price is somewhat weaker, and although some distributers are still getting 2c., Pittsburgh, for small orders, others are openly quoting 1.90c., on any attractive tonnage. The Youngstown warehouse price is unchanged at 2.20c. per lb. or 2.57½c., on cars at New York, and out of New York warehouse the common quotations are 2.80c. for lots of 5 tons or more, 2.95c. for lots of 2 to 5 tons and 3.24c. for less than 2 tons, all delivered at job.

Coke.—With scarcely any activity in the market and decreasing operations in the Connellsville district, prices are being maintained at $3.50 per ton, Connellsville, for standard foundry coke and $2.50 to $2.75 for the furnace grade. Special brands of foundry coke are quoted at $4.85, f.o.b. ovens, and delivered prices are: To northern New Jersey, Jersey City and Newark, $8.56 per net ton; to New York and Brooklyn, $9.44 per net ton. By-product foundry coke is unchanged at $9 to $9.40 per net ton, Newark or Jersey City, and $10.06 to $10.29 per net ton, New York or Brooklyn.

Philadelphia

Steel Prices Not Firm at $1 Advance and Few Contracts Have Been Made

PHILADELPHIA, July 2.—Apparently few third quarter contracts for bars, shapes and plates have been made at the new level of prices announced as effective for third quarter. The new prices are 1.90c., Pittsburgh, for bars, 2.05., Coatesville, for plates and 2.05c., Bethlehem, for shapes. Recent sales have been at prices $1 a ton lower in the case of bars and plates and $1 to $2 lower on shapes. At the opening of bids last week by the New York Central Railroad on its third quarter requirements there were low quotations of 1.90c., West Seneca, N. Y., on bars, 1.90c., Newberry Junction, on shapes and 1.85c., Newberry Junction, on plates. The Pennsylvania Railroad has not yet appeared as a buyer for third quarter except on track materials and steel pipe.

Pig Iron.—Many foundries in this district are shutting down for several days to a week for the usual inventory period, and the market has become less active than in recent weeks. Contracting for third quarter has been light. The price on the foundry grade is unchanged at $20, furnace. Low phosphorus has been sold in fair quantities in other districts, but locally demand is light.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$20.76
East. Pa. No. 2X, 2.25 to 2.75 sil.	21.26
East. Pa. No. 1X.....	21.76
Basic (del'd east. Pa.)...	$19.00 to 19.50
Gray forge	19.75 to 20.25
Malleable	21.00 to 21.50
Stand. low phos. (f.o.b. N. Y. State furnace)...	22.00 to 23.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.50 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	24.54
Va. No. 2X, 2.25 to 2.75 sil.	25.04

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Ferromanganese. — The larger consumers have been covering for third quarter and second half at $105 per ton, seaboard. A recent inquiry is for 1000 tons of 78 to 82 per cent ferromanganese for the Fordson plant of the Ford Motor Co.

Billets.—Rerolling quality billets are still quoted at $33 per ton, Pittsburgh, but about $1 a ton less could be done on a desirable specification. The forging grade is firm at $38 per ton, Pittsburgh.

Bars.—Mills are asking 1.90c., Pittsburgh, or 2.22c., delivered, Philadelphia, on new business, but recent sales have been at 1.85c., Pittsburgh. It is likely that the new department store building for Strawbridge & Clothier will be built of reinforced concrete, in which case about 4000 tons of bars will be required.

Shapes.—Efforts to bring shape prices up to the levels of bars and plates do not appear to have met with much success, and although 2.05c., Pencoyd, or 2.11c., Philadelphia, and 2.05c., Bethlehem, or 2.18c., Philadelphia, are still being quoted on current business, a price $1 a ton below the above-mentioned minimum is not uncommon; on especially desirable tonnage even less than 2c., Pencoyd, is said to be obtainable.

Plates.—Mills are obtaining 2.05c., Coatesville, or 2.15c., Philadelphia, on small orders for prompt shipment. In some cases contracts have been made at 2c., Coatesville, or 2.10c., Philadelphia.

Sheets.—Few contracts have been made for the third quarter, consumers evidently intending to buy as their needs arise. Blue annealed sheet sales are being made at 2c. to 2.10c., Pittsburgh, or 2.32c. to 2.42c., Philadelphia. Black sheets are quiet at 2.65c., Pittsburgh, or 2.97c., Philadelphia, and galvanized sheets are still quoted at about 3.50c., Pittsburgh, or 3.82c., Philadelphia.

Warehouse Business.—June business was smaller than that of May and current buying is confined almost

entirely to very small lots. Prices are being maintained and the quantity differentials are generally observed.

Old Material.—All grades of scrap continue weak. Railroad grate bars are quotable at $11 to $12 per ton, delivered, on the basis of recent small sales to foundries at about $12 per ton, though steel plants have not paid above $11. The total of No. 1 heavy melting steel recently bought by a large eastern Pennsylvania consumer is reported at 25,000 to 30,000 tons, and the price was $13 per ton, delivered. Yard grade of heavy melting steel has been bought at $10.50 per ton, delivered Harrisburg and Pottsville, Pa. While heavy axle turnings are quoted at $12 per ton, the maximum that has been paid by steel mill consumers, small lots have been sold to steel foundries at $12.50 and $13 per ton, delivered.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$13.00 to $13.50
Scrap T rails	12.50 to 13.00
No. 2 heavy melting steel	10.50 to 11.00
No. 1 railroad wrought	13.50 to 14.50
Bundled sheets (for steel works)	10.00 to 10.50
Machine shop turnings (for steel works)	10.50
Heavy axle turnings (or equiv.)	12.00
Cast borings (for steel works and roll. mill)	10.50
Heavy breakable cast (for steel works)	15.00 to 15.50
Railroad grate bars	11.00 to 12.00
Stove plate (for steel works)	11.00
No. 1 low phos., hvy., 0.04% and under	17.50 to 18.00
Couplers and knuckles	14.50 to 15.00
Rolled steel wheels	14.50 to 15.00
No. 1 blast f'nace scrap	9.50 to 10.00
Mach. shop turnings (for roll. mill)	11.00 to 11.25
Wrot. iron and soft steel pipes and tubes (new specific.)	12.00 to 12.50
Shafting	17.00 to 17.50
Steel axles	19.00 to 20.00
No. 1 forge fire	11.00 to 11.50
Cast iron carwheels	15.50 to 16.00
No. 1 cast	15.50 to 16.00
Cast borings (for chem. plant)	14.50 to 15.00
Steel rails for rolling	14.50 to 15.00

Imports.—In the week ended June 30, arrivals of iron ore totaled 6450 tons from Algeria, and 602 tons of chrome ore came in from Portuguese Africa. Only 251 tons of pig iron was received, all from the Netherlands. Steel arrivals consisted of 100 tons of steel bars, 841 tons of structural shapes, 183 tons of skelp, 50 tons of steel plates and 62 tons of steel bands from Belgium; 31 tons of blooms from France; 106 tons of structural shapes and 34 tons of steel scrap from Germany.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.50c. to 2.60c.
Plates, ⅜-in.	2.80c. to 3.00c.
Structural shapes	2.40c. to 2.60c.
Soft steel bars, small shapes, iron bars (except bands)	2.60c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel, planished	4.30c.
Reinforc. steel bars, sq. twisted and deform.	2.50c. to 3.00c.
Cold-fin. steel, rounds and hex	3.35c.
Cold-fin. steel, sq. and flats	3.85c.
Steel hoops	3.50c.
Steel bands, No. 12 to ⅜-in., inclus.	3.25c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.85c.
†Galvanized sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.15c.
Diam. pat. floor plates—¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Cleveland

Steel Buyers Slow to Contract for Third Quarter—Basic Pig Iron Is Firmer

CLEVELAND, July 2.—The third quarter has started with very little contract tonnage on the mill books. There is still a lack of confidence on the part of buyers that the 1.90c. price will be maintained on steel bars, plates and structural material, although mills are still holding out for the advance. Quite a few contracts were taken at 1.90c. during the week, but in these cases buyers evidently felt assured that should the market settle down to 1.80c. they will be given advantage of the lower price. An Ohio mill has closed some third quarter plate contracts at 1.85c., but is now asking 1.90c. Although plates appear to be still available at 1.85c., consumers as a rule are still inclined to withhold the placing of contracts and mills are making little effort to force sales.

Specifications against expiring second quarter contracts showed a fair gain in the past week and as mills continued to take current orders up to July 1 at the 1.85c. price, many consumers are covered for their July requirements. In spite of the better specifications during the week, the tonnage booked in this territory in June fell slightly below that of May.

Several of the automobile companies in the Michigan territory are slowing down production and will take considerably less steel this month than in June. However, large orders are coming from one or two car companies which are bringing out new models and recent production has been maintained by one or two makers of low priced cars. Taking it altogether, business from the automotive field is expected to be quite satisfactory for July and most of the automobile makers are buying for a month's requirements, although some have inquiries out for the third quarter.

Pig Iron.—The market has continued fairly active in most districts served by furnaces operated by Cleveland interests. Sales by these producers during the week totaled 34,000 tons in foundry and malleable iron. An Ohio sanitary interest purchased 1000 tons and there was some round-lot buying in the Michigan territory. The National Malleable & Steel Casting Co. purchased 1000 tons of basic iron from a broker for its Sharon, Pa., plant at $16.50, delivered. This will be shipped from the Youngstown district and indicates a firmer tone in the basic market. Following the recent 50c. per ton concession to $17.50, furnace, for foundry and malleable iron for Cleveland delivery, that has become the ruling Cleveland price. This makes the price 50c. a ton under the delivered price of Valley iron at $16.75, furnace. Prices are unchanged in other sections. Lake furnace quotations range from $16.25 to $17, except in Michigan, where $17.50 is being maintained. A Cleveland producer is seeking business in the Michigan territory. Shipments during June were about equal to those in May. The usual July shutdown has resulted in some curtailment in shipping orders. Shipments to the automotive industry are expected to show a falling off of 20 per cent this month, compared with June's.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	$18.00
S'th'n fdy., sil. 1.75 to 2.25	21.50
Malleable	18.00
Ohio silvery, 8 per cent	28.00
Basic Valley furnace	16.00
Stand. low phos., Valley furn	26.50

Prices, except on basic and low phosphorus, are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6 from Birmingham.

Semi-Finished Steel. — A local maker has reestablished its present prices of $32.50 to $33, Cleveland, for sheet bars, billets and slabs for the third quarter and has closed with many of its customers on that basis. This producer is still able to keep all of its 14 open-hearth furnaces in operation.

Coke.—There is a fair demand for foundry coke in specifications against contracts, but little new demand. Prices are unchanged at $3.50 to $4.85 a ton, ovens, for standard Connellsville foundry coke and $7.75 for Ohio by-product coke.

Bolts, Nuts and Rivets.—Orders from the automotive and agricultural implement manufacturers and jobbers are holding up well. One local maker reports a gain of 10 per cent in business during June over May, although this is probably exceptional. Most buyers have covered with third-quarter contracts. Rivets are dull.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struct. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.75c.
Cold-fin. rounds and hex	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.75c.
Galvanized sheets (No. 24)	4.40c. to 4.50c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb	$2.85
No. 9 gal. wire, per 100 lb	3.30
Com. wire nails, base per keg	2.85

*Net base, including boxing and cutting to length.

Iron Ore.—Water shipments of Lake Superior ore during June were 8,926,216 tons, compared with 8,458,866 tons during the same month last year. Lake shipments to July 1 were 14,295,125 tons, compared with 17,771,423 tons during the corresponding period last year.

Sheets. — New demand is light, consumers' stocks are low and most buyers want quick deliveries. Buyers, as a rule, are showing no interest in third quarter contracts. Specifications from the automotive industry are holding up well. Prices show virtually no change. Black sheets are well stabilized at 2.65c., Pittsburgh, although some business is going at 2.60c. Blue annealed sheets range from 1.90c. to 2c., Pittsburgh, and galvanized from 3.45c., Valley, to 3.50c., Pittsburgh. Jobbers are quoting car lots at 3.55c., Valley. Auto body sheets are firm.

Strip Steel.—A fair amount of new business in hot-rolled was placed by the automotive industry during the week and most large consumers are under cover for either the third quarter or several weeks' requirements at prices they paid for the last quarter, or 1.75c., Pittsburgh, for 6-in. and wider strip and 1.85c. for 3 to 6-in. materiål. A fair volume of activity has developed. On cold-rolled strip the $2 a ton reduction to 2.65c., Cleveland, for 3 tons and over now appears to be quite general.

Wire Products.—The nail market in northern Ohio has a weaker tone than recently and buyers are finding it easier to secure the $2.55 per keg price. This is commonly quoted to jobbers. Wire is firm.

Reinforcing Bars.—Keen competition is still causing price irregularities on billet steel bars. Rail steel bars are unchanged at 1.75c., mill. New inquiry is light.

Warehouse Business.—The volume of sales during June was about the same as in May. Prices are well maintained, except on black and galvanized sheets.

Old Material.—A Cleveland mill purchased 4000 to 5000 tons of machine shop turnings during the week at an average price of about $7.85 a ton. Dealers have bought some scrap against these contracts at $7.50, but some are now offering only $7.25. This is a good advance over prices that have been prevailing here recently for local scrap that must find an outside market, but the mill price is well under the price at which Detroit scrap with a $3 a ton freight rate can be delivered in Cleveland. The general tone of the market is weak. Blast furnace scrap is 24 cents a ton lower, evidently reflecting the weakening in pig iron prices. The maximum price now is $9.25, and although the supply is not plentiful at that price, distress material has sold as low as $9. Dealers are now buying heavy melting steel scrap covering the specifications of a local mill at $13.40, as compared with a recent price of $13.60.

Prices per gross ton, deliv'd consumers' yards:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$13.00 to $13.25
No. 2 heavy melting steel	12.50 to 12.75
Compressed sheet steel	12.50 to 13.00
Light bundled sheet stamp'gs	11.50 to 11.75
Drop forge flashings	11.50 to 11.75
Machine shop turnings	7.25 to 7.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	13.50 to 13.75
No. 1 busheling	11.00 to 11.25
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades	
Low phos. forging crops	16.50 to 17.00
Low phos., billet, bloom and slab crops	17.00 to 17.50
Low phos. sheet bar crops	16.50 to 17.00
Low phos. plate scrap	16.00 to 16.50
Blast Furnace Grades	
Cast iron borings	9.00 to 9.25
Mixed bor'gs and short turn'gs	9.00 to 9.25
No. 2 busheling	9.00 to 9.25
Cupola Grades	
No. 1 cast	16.25 to 16.75
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft	16.75 to 17.25
Miscellaneous	
Railroad malleable	15.00 to 15.50
Rails for rolling	16.25 to 16.50

RAILROAD EQUIPMENT

THE Erie Railroad has ordered 100 steel furniture cars and the Chicago & Eastern Illinois is inquiring for 100 automobile cars. The Norfolk & Western will rebuild 500 90-ton steel gondolas at its Roanoke shops. Details of the week's business follow:

Chesapeake & Ohio is inquiring for six gas-electric rail motor cars and five trailers.

Saginaw Logging Co., Saginaw, Mich., has purchased one 2-8-8-2 type locomotive from Baldwin Locomotive Works.

International Railways of Central America have ordered four 2-8-2 type locomotives from Baldwin Locomotive Works.

Chicago & Illinois Midland has ordered one 4-4-0 type locomotive from Baldwin Locomotive Works.

Erie Railroad has placed order for 100 steel furniture cars with Magor Car Corporation.

Norfolk & Western will rebuild 500 90-ton steel gondola cars at its Roanoke, Va., shops.

Cities Service Corporation, New York, has made inquiry for four tank cars.

Chicago & Eastern Illinois will buy 100 40-ft. automobile cars.

Wage Coal and Coke Scale Reduction

The H. C. Frick Coke Co., coal and coke subsidiary of the United States Steel Corporation, has posted notices of an adjustment in wage scales, effective July 1, the first change made by this company since Aug. 23, 1922. No change has been made in the scale for pick mining, nor in the rate for outside day labor, but all other classifications have been reduced and will now draw wages slightly higher than the average of independent companies.

The adjustment has no significance outside of the coal industry. Since August, 1922, the company has been paying substantially the so-called Jacksonville wage scale without the check off and has been standing alone for more than a year in paying that scale, as the operators who formerly operated under an agreement with the union did not renew the arrangement with its termination on April 1, 1927. It was a recognition of the fact that its scale was unnecessarily high that prompted the revision. The official statement observes:

"The H. C. Frick Coke Co. has always paid and will continue to maintain its policy of paying the highest prevailing rate in the district in which it operates."

The United Engineering & Foundry Co., Pittsburgh, has completed at its Frank-Kneeland plant one of its new No. 130 slab shears. It is of the motor-driven, down cut, crank and pitman type with a cast steel knife head running in slides fitted with bronze liners. It has a speed of 12 cuts per min. and a stroke of 10 in. The pressure exerted between the knives, which have no rake and are 45 in. long, is 1,300,000 lb., capable of shearing a hot soft steel slab 6 in. thick and 40 in. wide.

Steel Furniture Business Far Ahead of Last Year

Orders for steel furniture in the "business group" in May were valued at $3,085,365, against $2,915,344 in April, according to reports received by the Department of Commerce from 33 manufacturers. May, 1927, showed only $2,381,369. Sales of steel furniture in the "shelving group" in May were valued at $732,921, compared with $740,658 in April, according to reports received from 15 companies. In May, 1927, the total was $686,144.

Shipments in the "business group" in May were valued at $3,213,018, against $3,065,637 in April, while unfilled orders at the end of May were valued at $2,232,594, compared with $2,359,877 at the end of April.

For the five months ended with May orders in the "business group" were valued at $15,828,064, compared with $13,812,453 for the corresponding period of last year, while shipments were valued at $15,069,196 and $13,876,272 respectively.

May shipments of shelving furniture were valued at $768,562, against $716,104 in April, and unfilled orders were valued at $752,512 and $793,903 respectively.

Orders in this group for the five months ended with May were valued at $3,824,735, compared with $3,232,206 for the corresponding period of last year, while shipments were valued at $3,678,536 and $3,117,543 respectively.

San Francisco

Shapes in Chief Demand—Concrete Bars Made Best Showing in First Half

SAN FRANCISCO, June 29 (*By Air Mail*).—Tonnage movement on the Pacific Coast during the first half of the year, with one exception, reinforcing steel bars, did not equal the volume for the first half of 1927. Mill representatives are, however, well satisfied in general with bookings. The unsatisfactory price structure applies both to plain material and to finished products. The outlook for the rest of the year is fair.

Building activity in Los Angeles is well maintained and during the first 20 days of the month 2100 permits were issued, with a valuation of $6,878,087, compared with 2092 permits and a value of $6,147,557 for the same period in June, 1927.

Pig Iron.—Little of importance has happened in the foundry iron market during the past week, both sales and inquiries involving relatively small lots. No change is noted in prices, which are as follows:

Prices per gross ton at San Francisco:

*Utah basic	$25.00 to $26.00
*Utah fdy., sil. 2.75 to 3.25	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25	24.00 to 25.00
**German fdy., sil. 2.75 to 3.25	24.25

*Delivered San Francisco.
**Duty paid, f.o.b. cars San Francisco.

Bars. — Reinforcing steel bar awards this week did not exceed 400 tons. Bookings for the first half of the year, as reported each week in THE IRON AGE, aggregated 33,098 tons. The Pacific Coast Steel Co. secured 155 tons for the Sears-Roebuck Building at Tacoma, and 100 tons for a mausoleum in San Jose, Cal. Prices in the Bay district are slightly stronger and 2c. on out-of-stock material appears to be the general run now, fewer 1.80c. quotations coming out.

Plates.—Plate awards during the first half of the year were nearly a third less than the bookings for the corresponding period last year. This condition is due to the inactivity in the oil fields in California and also to the fact that several large pipe line projects went to reinforced concrete instead of riveted or welded steel. No awards of size were reported this week. Prices range from 2.25c. to 2.30c., the former figure applying to desirable tonnage.

Shapes. — The structural steel shape market continues to be the most active one on the Coast. Awards this week were light, only two projects of over 100 tons going through. The Wallace Bridge & Structural Steel Co. took 450 tons for a clinker storage warehouse for the Pacific Coast Cement Co. at Seattle, and Judson-Pacific Co. secured 270 tons for an addition to the Robert Dollar Building in San Francisco. For the first half of this year 87,075 tons of shape and plate material were booked. Prices on plain shapes from domestic sources remain firm at 2.35c., c.i.f.

Cast Iron Pipe.—Demand for cast iron pipe has fallen off and awards this week totaled less than 500 tons. Bookings during the first half of the year totaled 41,834 tons, which approximated the tonnage placed during the same period a year ago. The U. S. Cast Iron Pipe & Foundry Co. took 115 tons of 8 to 20-in. centrifugal pipe for Seattle. The Gateway Concrete Pipe & Products Co., Holtville, Cal., were awarded 321 tons of 4 to 10-in. class B pipe for Holtville. Pending business does not exceed 1100 tons.

Coke.—Both sales and inquiries of coke were limited to small lots. Stocks in foundry yards appear sufficient to take care of present requirements.

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes	3.15c.
Soft steel bars	3.15c.
Small angles, ⅞-in. and over	3.15c.
Small angles, under ⅞-in.	3.55c.
Small channels and tees, ¾-in. to 2¾-in.	3.75c.
Spring steel, ¼-in. and thicker	5.00c.
Black sheets (No. 24)	4.95c.
Blue ann'l'd sheets (No. 10)	3.90c.
Galv. sheets (No. 24)	5.50c.
Struc. rivets, ½-in. and larger	5.65c.
Com. wire nails, base per keg	$3.40
Cement c't'd nails, 100-lb. keg	3.40

Boston

Railroad Bridge Work to Take 15,000 Tons of Steel—Coke Price Unchanged

BOSTON, July 2.—Most of the pig iron orders taken in the past week called for car lots or special analyses. The aggregate tonnage was less than it has been for any similar period in months. Prices appear steadier, as there is little incentive to shade them. One foundry is inquiring on 1200 to 1500 tons of No. 2X and No. 1X. Otherwise there is no prospective business of importance. A large majority of the jobbing foundries report business as poor, but most of the large ones and the most important manufacturing foundries say it is better than a month ago. At the current rate of melt, New England foundries in general have sufficient iron on hand or on order to last into the third quarter, and some cases into the fourth.

Foundry iron prices per gross ton deliv'd to most New England points:

Buffalo, sil. 1.75 to 2.25	$20.91 to $21.91
Buffalo, sil. 2.25 to 2.75	21.41 to 22.41
East. Penn., sil. 1.75 to 2.25	23.15 to 23.65
East. Penn., sil. 2.25 to 2.75	23.65 to 24.15
Va., sil. 1.75 to 2.25	25.71
Va., sil. 2.25 to 2.75	26.21
Ala., sil. 1.75 to 2.25	22.41 to 24.27
Ala., sil. 2.25 to 2.75	22.91 to 24.77

Freight rates: $4.91 from Buffalo, $3.65 from eastern Pennsylvania, $5.21 all rail from Virginia, $6.91 to $8.77 from Alabama.

Coke.—The New England Coal & Coke Co. and the Providence Gas Co. announce that there will be no change in the price of by-product foundry coke in July. It remains at $11 a ton, delivered within a $3.10 freight rate zone. Both companies also report a decided improvement in the demand for such fuel. Shipments in the closing week of June were larger than for any similar period in almost a year. In explanation, it is said that a large number of foundries suddenly ran out of fuel. The New England iron melt has not increased perceptibly. Domestic fuel is moving in fair volume.

Shapes and Plates.—No important fabricating jobs have been awarded, but there have been a large number of small lettings. With five new Boston & Maine Railroad bridges up for figures, indications are that approximately 15,000 tons of steel will be awarded within the next fortnight. Mills generally quote standard plates at 1.90c. per lb., base Pittsburgh, but fabricators claim that price could be shaded on a sizable tonnage. Bookings are only fair. Buying of plates continues on a hand-to-mouth basis, with 1.90c. per lb., base Pittsburgh, the going price on ordinary orders.

Cold-Rolled Strip.—Buying of cold-rolled strip steel is only fair. So far there has been no general third quarter buying. While most mills are endeavoring to obtain the equivalent to 3.30c. per lb., Worcester, for 1 to 3-

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway round	6.60c.
Norway, squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucib'e	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold rolled steel—	
Rounds and hex	*3.45c. to 5.45c.
Squares and flats	*3.95c. to 6.95c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentia's.

ton lots, others have cut prices as low as 3.15c.

Warehouse Business.—New England warehouses did a larger business in June than in May, or in June, last year. This showing is all the more noteworthy in view of general business conditions and to the hand-to-mouth character of purchases from warehouse. Prices are firmer than a month ago, cuts being few and by small sellers. No reduction has been made in cold-finished stock, despite the cut in mill prices.

Cast Iron Pipe.—So far as can be ascertained the C. & R. Construction Co. has not placed the 4000 tons of 36-in. pipe required for its State contract. There is a possibility that steel pipe will be used. Portland, Me., is calling for bids on a sizable tonnage of 16-in. flexible-joint pipe, although the Government has not approved that city's plans. Lynn, Mass., is calling for bids on July 2 for 150 tons of 6-in. to 12-in. pipe. Private business is seasonally quiet. The price situation remains unchanged. The market for 4-in. pipe is firm at $45.10 to $46.10 a ton, delivered common Boston freight rate points, and at $41.10 to $42.10 for 6-in. to 12-in. Larger pipe is still subject to concessions. The usual $5 differential is asked for Class A and gas pipe.

Old Material.—Buying and selling continues on a small scale. Anticipated purchases of yard and No. 1 steel for export to Danzig did not develop, but is reasonably certain to come within a week or 10 days. The export movement has been held up by a lack of steamer space. Prices in general appear easy, although not actually lower, except in the case of No. 1 heavy melting steel and steel turnings. About the most that dealers will now pay for heavy melting steel is $8.10 a ton, on cars shipping point. One of the eastern Pennsylvania mills is reported as buying directly and offering $9 a ton, but no actual sales are reported in New England. The most that dealers will generally pay for steel turnings for steel mill use is $5 a ton, off 50c. less than a week ago, but $5 to $5.50 is paid where shipment is made to blast furnaces. New England foundries continue to take small tonnages of both textile cast and No. 1 machinery, the aggregate sales for the week running into several hundred tons.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel.	$7.75 to	$8.10
Scrap T rails	8.00 to	8.50
Scrap girder rails	7.50 to	8.00
No. 1 railroad wrought	9.00 to	9.50
No. 1 yard wrought	7.00 to	7.50
Machine-shop turnings	4.75 to	5.00
Cast iron borings (steel works and rolling mill)	5.25 to	5.50
Bundled skeleton, long	5.00 to	7.00
Forge flashings	6.50 to	7.00
Blast furnace borings and turnings	5.00 to	5.50
Forge scrap	5.50 to	6.00
Shafting	12.00 to	12.50
Steel car axles	14.50 to	15.00
Wrought pipe 1 in. in diameter (over 2 ft. long)	7.00 to	7.50
Rails for rolling	9.50 to	10.00
Cast iron borings, chemical	10.00 to	10.25

Prices per gross ton deliv'd consumers' yards:

Textile cast	$13.50 to	$14.00
No. 1 machinery cast	14.00 to	14.50
No. 2 machinery cast	12.50 to	13.50
Stove plate	10.00 to	10.50
Railroad malleable	13.50 to	14.50

Birmingham

One Blast Furnace Goes in and Another Is Ready—Steel Backlogs Maintained

BIRMINGHAM, July 2.—Pig iron sales are showing a gradual improvement following the recent price reduction. No marked movement has developed and the buying as a whole is steady. Some of the more important tonnages are still in abeyance, which is attributed largely to a carry over into July. Consumers appear to be satisfied with the new price of $15.50 for No. 2 foundry iron. Shipments during the past week were off slightly. June shipments were a little ahead of those of the preceding month. The new No. 5 Fairfield furnace of the Tennessee company was blown in June 26 on foundry. The new No. 6 furnace at Fairfield is expected to be blown in by the middle of the month. Nineteen furnaces are now in blast. Of this number 11 are on foundry, six on basic, one on recarburizing iron and one on ferromanganese.

Prices per gross ton f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$15.50
No. 1 fdy., 2.25 to 2.75 sil.	16.00
Basic	$15.00 to 16.00

Finished Steel.—Operating backlogs are being well maintained in most lines. Inquiries vary from day to day, but are considered satisfactory as a whole. Prices show more steadiness than for several weeks. The minimum price on plates and shapes is now 2.05c., base, f.o.b. Birmingham. Structural steel fabricators and bar manufacturers report a noticeable increase in sales during the past week. The Ingalls Iron Works secured contracts for 3700 tons for a powerhouse at Mount Holly, N. C., for the Duke Power Co. and 250 tons for a hydroelectric plant at Watersville, N. C., for the Phoenix Utility Co. The Tennessee company is now operating six open hearths at Ensley instead of seven. Five are in operation at Fairfield and the Gulf States Steel Co. continues to work four at Alabama City.

Cast Iron Pipe.—Pressure pipe manufacturers experienced another quiet week from the standpoint of both sales and inquiries. The market has lapsed into a dull period every few weeks during the past five months. Plant operations are up to normal and shipments continue to run close to production. Prices show a tendency toward firmness, with quotations at $32 to $33 for sizes of 6 in. and over.

Coke.—Most of the contract business for the last half has been placed. The spot market is only moderately active. Quotations remain unchanged, the base being $5 for both spot and contract.

Old Material.—The market is still lacking in consumer interest and shows no indication of a change from the unusual dullness of the past three weeks. Prices are unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$8.50 to	$9.00
Scrap steel rails	11.00 to	11.50
Short shoveling turnings	7.50 to	8.00
Cast iron borings		8.00
Stove plate		13.50
Steel axles	19.00 to	20.00
Iron axles	20.00 to	21.00
No. 1 railroad wrought	10.00 to	10.50
Rails for rolling		13.00
No. 1 cast		14.25
Tramcar wheels	12.50 to	13.50
Cast iron carwheels	12.00 to	13.00
Cast iron borings, chem.	13.50 to	14.00

Buffalo

Mill Operations Average 80 Per Cent—Boat Shipments Reduce Local Scrap Demand

BUFFALO, July 2.—Little pig iron business has been placed recently. Inquiries are almost entirely for lots of 50 to 100 tons. The Massey-Harris Harvester Co. is still in the market for 1000 to 2000 tons for Batavia, N. Y., and Canada, and this seems to be the only outstanding tonnage. Shipments against old orders are good, and prices in this district, at $17 for No. 2 plain and $17.50 for malleable, appears to be firm. Twelve furnaces are in blast here.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$17.00
No. 2X fdy., sil. 2.25 to 2.75	17.50
No. 1X fdy., sil. 2.75 to 3.25	18.50
Malleable, sil. up to 2.25	17.50
Basic	$16.50 to 17.00
Lake Superior charcoal	27.28

Finished Steel.—Mill operations continue to average about 80 per cent. Bars and shapes are fairly firm, but sheets are softer. On bolts and nuts the market is stable. Specifications for bolts and nuts are a shade lighter

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struct. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.75c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.70c. to 5.05c.
Blue ann'l'd sheets (No. 10)	3.70c.
Com. wire nails, base per keg	$3.65
Black wire, base per 100 lb.	3.90

than last month, though orders and specifications from automotive companies exceed expectations. A considerable tonnage in small lots of reinforcing bars has been booked. Included was 400 tons for the caissons of the new Rand Building, Buffalo. Demand for bars from warehouse is heavier because mills are charging an extra on lots of 2 tons or less.

Old Material.—The outstanding feature of the market is the practically complete suspension for three weeks of all scrap shipments to the largest consumer in the district. Operations at this plant continue high, but boat shipments of scrap from Detroit are cutting into the business of local dealers. One consumer has bought 1000 tons of heavy melting steel at $14.25, and stove plate has been sold at $13.50. No. 2 steel has been purchased at a reported price of $12.25. A small tonnage of No. 1 machinery cast has been sold at $14 to $14.25. The Michigan Central, Pennsylvania and Erie Railroad lists close the week of July 2. The tendency of the market is to soften.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades	
No. 1 heavy melting steel	$14.00 to $14.25
No. 2 heavy melting steel	12.25 to 12.75
Scrap rails	13.50 to 14.00
Hydraulic comp. sheets	12.25 to 12.75
Hand bundled sheets	8.50 to 9.00
Drop forge flashings	12.00 to 12.50
No. 1 busheling	12.25 to 12.75
Hvy. steel axle turnings	12.00 to 12.50
Machine shop turnings	7.75 to 8.25
Acid Open-Hearth Grades	
R'lr'd knuckles and couplers	15.00
R'lr'd coil and leaf springs	15.00 to 16.00
Rolled steel wheels	15.00
Low phos. billet and bloom ends	16.00 to 16.50
Electric Furnace Grades	
Hvy. steel axle turnings	12.00 to 12.50
Short shov. steel turnings	10.00 to 10.50
Blast Furnace Grades	
Short shov. steel turnings	10.00 to 10.50
Short mixed borings and turnings	9.50 to 10.00
Cast iron borings	9.50 to 10.00
No. 2 busheling	9.00 to 9.25
Rolling Mill Grades	
Steel car axles	15.50 to 16.00
Iron axles	12.00 to 12.50
No. 1 railroad wrought	12.00 to 12.50
Cupola Grades	
No. 1 machinery cast	14.25 to 14.75
Stove plate	13.00 to 13.25
Locomotive grate bars	11.50 to 12.00
Steel rails, 3 ft. and under	16.50
Cast iron carwheels	12.00 to 12.50
Malleable Grades	
Industrial	15.00
Railroad	15.00
Agricultural	15.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struct. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.45c.
Galv. sheets (No. 24)	5.25c.
Blue ann'l'd sheets (No. 10)	3.60c.
Black corrug. sheets (No. 24)	4.50c.
Galv. corrug. sheets	5.30c.
Structural rivets	3.75c.
Boiler rivets	3.75c.
	Per Cent Off List
Tank rivets, ⅞-in. and smaller, 100 lb. or more	70
Less than 100 lb.	65
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-press. nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-press. nuts, hex., b'ank or tapped, 200 lb. or more	60
Less than 200 lb.	50

St. Louis

Third Quarter Pig Iron Sales—Several Railroad Steel Inquiries

ST. LOUIS, July 2.—The principal pig-iron purchase of the week was 1200 tons by stove manufacturer in the district from the St. Louis Gas & Coke Corporation for third quarter shipment, and other stove foundries contributed to that maker's total of 2600 tons for the week. Most stove foundries in the district will close the first week in July for inventory, and then it is expected that they will resume on nearly full scale, when furnaces look for considerable buying from this source. An Indiana implement maker took 500 tons for third quarter and the only other sizable order of the week was 300 tons from an Iowa job foundry. Sales of Southern iron were light. Prices are unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$19.00
N'th'n No. 2 fdy., deliv'd St. Louis	20.16
Southern No. 2 fdy., deliv'd	19.92
Northern malleable, deliv'd	20.16
Northern basic, deliv'd	20.16

Freight rates: 81c. Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Coke.—Buying of coke is disappointing to the by-product ovens in the district. Dealers are acting slowly in laying in their winter's supply, and foundries are behind their contract schedules.

Finished Iron and Steel. — The Granite City Steel Co. reports that all of their departments are operating full except galvanized sheets, which is at 60 to 65 per cent of capacity. Incoming business in sheets shows some improvement, and that company is holding firm at recent new prices, although it is understood that some mills are cutting prices to get business. The Missouri Pacific and Missouri-Kansas-Texas Railroads are in the market for third quarter requirements of plates, shapes and bars, and the St. Louis Southwestern Railroad has asked for prices on third quarter requirements of track bolts and track spikes. Warehouse business is fair in the St. Louis industrial district, although not quite up to this period last year, but very little is coming from the oil fields, whose demand normally is large. Business with structural fabricators is light.

Old Material.—The market for scrap continues quiet, and there is little buying by consumers or by dealers, the latter having about covered on all contracts. Mills give no indications of buying anything soon except small tonnages here and there to fill out. Heavy melting steel, heavy shoveling steel, railroad springs, No. 2 railroad wrought, No. 1 busheling, steel car axles, No. 1 railroad wrought, steel angle bars, and cast iron car wheels are 25c. a ton lower, and machine shop turnings, wrought iron bars and transoms are 50c. lower. Relaying rails of 60 to 90-lb. weights are in fairly good demand from the coal fields. Railroad lists include: Chicago, Burlington & Quincy, 4500 tons; Big Four Lines, 1000 tons; Missouri Pacific Railroad, 160 carloads; Mobile & Ohio, 26 carloads.

Dealers' buying prices, per gross ton, f.o.b. St. Louis district:

Heavy melting steel	$10.75 to $11.25
No. 1 locomotive tires	12.00 to 12.50
Heavy shoveling steel	10.75 to 11.25
Miscell. stand.-sec. rails, includ'g frogs, sw'ches and guards, cut apart	12.25 to 12.75
Railroad springs	13.25 to 13.75
Bundled sheets	8.50 to 9.00
No. 2 railroad wrought	11.00 to 11.50
No. 1 busheling	9.50 to 10.00
Cast iron borings	8.75 to 9.25
Iron rails	13.00 to 13.50
Rails for rolling	13.00 to 13.50
Machine shop turnings	6.50 to 7.00
Steel car axles	17.25 to 17.75
Iron car axles	25.50 to 26.00
Wrot. iron bars and trans.	18.50 to 19.00
No. 1 railroad wrought	9.75 to 10.25
Steel rails, less than 3 ft.	15.00 to 15.50
Steel angle bars	11.50 to 12.00
Cast iron carwheels	13.00 to 13.50
No. 1 machinery cast	13.00 to 13.50
Railroad malleable	11.25 to 11.75
No. 1 railroad cast	13.00 to 13.50
Stove plate	11.00 to 11.50
Agricult. malleable	12.00 to 12.50
Relay. rails, 60 lb. and under	20.50 to 23.50
Relay. rails, 70 lb. and over	26.50 to 29.00

Youngstown

Numerous Holiday Week Suspensions—Bar Iron Mill Wages Advanced

YOUNGSTOWN, July 2.—Iron and steel production schedules in the Mahoning Valley reach a low point of the year in this week, because of suspensions for the Independence Day observance. All of the non-integrated sheet rollers in the upper-Mahoning Valley area will be idle for the week.

The Republic Iron & Steel Co. will operate its strip mills at the Warren property, but its sheet and tin plate units will be idle. Operation of finishing mills of the Youngstown Sheet & Tube Co. will be at a low ebb. The Carnegie Steel Co. suspends for the Fourth only, resuming Thursday with 75 per cent operations. Some finishing mills will remain idle until Thursday morning, when they will be started. The A. M. Byers Co. will operate its Trumbull county plants three turns for three days, with puddle mills at 55 per cent. Sharon Steel Hoop Co. suspends for the entire week.

The Newton Steel Co., maker of highly finished steel sheets used largely in the automobile trade, suspends the week of the Fourth for repairs and overhauling. The company still has a considerable volume of unfilled business on its books. Earnings the first four months were at the annual rate of $10 per common share.

Steel companies will take advantage of the suspensions to make the usual needed mid-year repairs to rolling mill equipment and to furnaces.

For July-August, tonnage rates paid boilers and finishing hands in mid-Western puddle and rolling mills advance 1½ per cent, as a result of the bi-monthly settlement in Detroit. The average selling price of bar iron shipped during the 60 days ended June 20 was disclosed at $1.90 per 100 lb., as compared with $1.85, at the previous examination of sales sheets.

Canada

Demand for Foundry and Malleable Pig Iron Improves—Structural Steel Outlook Promising

TORONTO, ONT., July 2.—During the last week of June the demand for foundry and malleable pig iron in the Canadian markets improved. Developments centered chiefly around third quarter contract placing, and a number of good orders were taken. It is estimated that about 60 per cent of the regular contract buyers are covered to the end of September, and about 10 per cent of the remainder have placed contracts to take care of their needs to the middle of August. Third quarter contracts were closed at prevailing prices, and at the moment there is little prospect of advances. Spot sales are being maintained at a steady level. Spot demand during June compared favorably with that of April and May. Prices are firm but unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$23.10 to $23.60
No. 2 fdy., sil. 1.75 to 2.25	23.10 to 23.60
Malleable	23.10 to 23.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	24.50 to 25.00
No. 2 fdy., sil. 1.75 to 2.25	24.50 to 25.00
Malleable	24.50 to 25.00
Basic	23.50 to 24.00
Imported Iron, Montreal Warehouse	
Summerlee	33.50
Carron	33.00

Structural Steel.—Improvement in business has followed the return of structural steel workers to their jobs. Delivery on old contract account has been resumed and many buildings that were held up are now going ahead and builders are trying to make up for the time lost. A strong demand is reported for structural steel and reinforcing bars in the Toronto and Montreal markets. Orders for upward of 5000 tons were closed during the week and between 25,000 and 40,000 tons is pending. For an office building to be erected by L. J. Wookey, Foy Building, Toronto, 3000 tons of structural steel will be required. Approximately 4000 tons of structural steel and 2000 tons of reinforcing bars will be needed in connection with building program for the Royal Hotel and Terminal Syndicate, Hamilton, Ont., of which F. G. Engholm, Bloor Building, is engineer. For the proposed printing plant at Calgary, Alta, for the Alberta Publishing Co., 1000 tons of structural steel and 500 tons of reinforcing bars will be needed. The Dominion Bridge Co., Winnipeg, Man., and the Hamilton Bridge Co., Hamilton, Ont., have the contract to supply approximately 6000 tons of structural steel for the new assembly plant at Regina, Sask., for General Motors of Canada, Oshawa, Ont.

Old Material.—With the exception of a few orders for third quarter delivery, business shows practically no change from that of the past week or two. Some interest is shown in materials for third quarter, but the majority of consumers prefer the hand-to-mouth method of buying. Orders for steel scrap from the Hamilton, Ont., district ran a good tonnage during the week, and several large orders for machinery cast, malleable scrap and wrought iron were received from buyers throughout the province. In the Montreal market dealers report a steady demand for heavy melting steel, machinery cast, wrought iron and steel axles and standard car wheels. For the fiscal year ended March 31, exports of iron and steel scrap totaled 76,147 tons, compared with 68,395 tons for the corresponding period ended March 31, 1927.

Dealers' buying prices:

	Toronto	Montreal
Per Gross Ton		
Heavy melting steel	$9.00	$7.00
Rails, scrap	10.00	9.00
No. 1 wrought	9.00	11.00
Machine shop turnings	7.00	5.00
Boiler plate	7.00	6.00
Heavy axle turnings	7.50	6.50
Cast borings	7.50	5.00
Steel turnings	7.00	5.50
Wrought pipe	5.00	5.00
Steel axles	14.00	20.00
Axles, wrought iron	16.00	22.00
No. 1 machinery cast	....	16.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
Per Net Ton		
No. 1 machinery cast	15.00	....
Stove plate	9.00	....
Standard carwheels	13.00	....
Malleable scrap	13.00	....

Detroit

Not Meeting Usual Summer Slump in Automobile Demand—Oakland to Expand Foundries

DETROIT, July 2.—Automobile production totals for June will differ probably not a great deal from May figures, some companies increasing production slightly and others slowing off somewhat.

Industrial employment in this area, according to the Employers' Association Index under date of June 19, fell off 273 from the figure of the week previous. The total as of June 19 stands at 263,197, which includes two-thirds of the city's working population. This figure compares with 191,303 in the corresponding week a year ago.

The production totals for the first five months of this year for Cadillac Motor Car Co. stand at 17,437 units, which is an increase of 39 per cent over the production for the similar period of 1927.

Charles F. Barth, general manager, announced June 26 that the minimum production scheduled by the Chevrolet Motor Co. for July, August and September had been set at 100,000 cars a month, as his company had failed to meet the usual buying slump noted at this time of year. The highest single day's production of Chevrolet units was attained May 28, with a score of 7075. It is certain that the Chevrolet company in the first half of 1928 will show greatest production in its histo.

The Ford Motor Co.'s production of model A stands somewhere between 2800 and 3000 units per day. The highest single day's production was that of June 11, showing in excess of 3000 units. For the week ended June 20, Ford company's employment showed 115,967, a decrease from the week previous, when the total stood at 117,200.

An additional group of foundry buildings will be constructed at Pontiac by the Oakland Motor Car Co., as increased capacity for Oakland and Pontiac cars. Work on this group will start immediately and will include six buildings, totaling 200,000 sq. ft. of floor space. The foundry unit will employ about 700 men.

The Packard Motor Car Co. has closed down for its vacation period of two weeks. Changes and alterations will be made to increase capacity over the standard figure of 4600 cars a month.

The weekly output of Willys-Overland Co. for the last three weeks has exceeded 10,000 units. This company enters July with approximately 20,000 unfilled orders on the books.

General Motors' sales for the current quarter have been in excess of 200,000 units a month. May sales stand at 207,325 units, with March and April just below the 200,000 mark. Sales for the first six months are better than 1,000,000 units.

The truck division of Dodge Brothers, Inc., reports 3000 unfilled orders for the new six-cylinder line, and production schedules have been increased.

The Fisher Body Corporation set a new high record for production on April 20, with a daily output of 7280 bodies.

Auto-body sheet stands at 4c., Pittsburgh, with blue annealed sheet from 2 to 2.10c., Pittsburgh. Cold finished bars are quoted at 2.10c., Pittsburgh, hot rolled 3 in. and narrower, 2.20c. to 2.30c., Pittsburgh, 3 to 6 in., 1.85c. to 2.10c., Pittsburgh,

with 6 in. and wider, 1.75c. to 1.90c., Pittsburgh. Bars, plates and shapes remain at 1.85c. to 1.90c., Pittsburgh.

There have been no large sales of scrap during the past week. Shipments by producers in July will be below those of last month. Prices are as quoted week ago.

Dealers' buying prices per gross ton f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$11.00 to $11.50
Borings and short turnings	7.00 to 7.50
Long turnings	5.75 to 6.25
No. 1 machinery cast	14.00 to 15.00
Automobile cast	19.00 to 20.50
Hydraul. comp. sheets	9.75 to 10.25
Stove plate	11.00 to 12.00
No. 1 busheling	8.50 to 9.00
Sheet clippings	6.00 to 6.50
Flashings	9.00 to 9.50

Cincinnati

Pig Iron Business Almost at Standstill But Steel Buying Improves in Spots

CINCINNATI, July 2.—Weakness in prices and the usual seasonal decline in foundry operations have had a depressing effect on pig iron sales, which have been almost at a standstill. The only sizable order in the past week was for 500 tons of foundry iron for the Louisville & Nashville. With the exception of an inquiry for 2000 tons of foundry iron from a Hamilton, Ohio, melter, pending business is of little consequence. Southern iron is quoted at $15.50, base Birmingham, but users are reluctant to make forward purchases in view of the uncertainty regarding the trend of their production in the next two months and of the likelihood that they may buy at the present price throughout the third quarter. Southern Ohio iron is selling at $18, base Ironton, with occasional dips of 50c. a ton. Lake Erie furnaces are reported to be accepting orders in competitive territory at from $16 to $16.50, base furnace. Jackson County silvery is unchanged at $25, base Jackson, for 8 per cent.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89
So. Ohio malleable	$20.14 to 20.89
Ala. fdy., sil. 1.75 to 2.25	19.19
Ala. fdy., sil. 2.25 to 2.75	19.69
Tenn. fdy., sil. 1.75 to 2.25	19.19
So'th'n Ohio silvery 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—The underlying tone of the market is slightly stronger than a week ago, although specifications against old contracts still are lagging somewhat and consumers are hesitant about signing third-quarter contracts for bars, structural shapes and plates at the new schedule of 1.90c., base Pittsburgh. Steel companies report that from 30 to 40 per cent of their customers have signed up for their requirements over the next 90 days at that figure. Sales of bars have been holding up well, and much of the tonnage has been taken by agricultural implement manufacturers, who are operating practically at capacity. Structural steel has been quiet, because of the dearth of sizable jobs in this district. In fact, most fabricators have been compelled to curtail production on account of the lack of orders. While prices of sheets have not dropped further in the past week, the situation has not improved. Galvanized sheets for roofing purposes are selling in the South at from 3.30c. to 3.50c., base Pittsburgh, with 3.40c. prevailing as a common average. On metal furniture sheets mills have quoted 3.85c. to 3.90c., base Pittsburgh, on No. 24 gage, A grade, but have made concessions of from $2 to $3 a ton to large users. Blue annealed and automobile body sheets, on the other hand, have been fairly well stabilized at 2c. and 4c., base Pittsburgh, respectively. Bookings of district mills have approached 80 per cent of capacity, while operations are being carried on at about 90 per cent. Specifications from the automobile industry have been sustained at a satisfactory rate, and demand for special enameled stock has been good. There has been a recession in orders for wire goods, the decrease being largely of a seasonal character. Common wire nails continue to be quoted at $2.50 per keg, base Ironton, and plain wire at $2.40 per 100 lb., base Ironton.

Reinforcing Bars. — The Pollak Steel Co. will supply 188 tons of rail steel bars for an addition to the plant of the Andrew Juergens Co., Cincinnati, and 133 tons for a building to be erected in Detroit by the Swift Packing Co. Awards of from 25 to 100 tons of bars have been numerous. Prices are firm, with new billet bars quoted at 1.85c. to 1.90c., base Pittsburgh, and rail steel stock at 1.80c., base mill.

Warehouse Business. — Sales in June were slightly better than those during May, although two important jobbers report a falling off in business in the past month. Soft steel and iron bars lead in volume of orders, with structural shapes and plates closely following. Demand for steel boiler tubes and for steel pipe has been fair. There has been no change in prices. The decline in sheet quotations in other markets has not affected schedules locally, and jobbers are of the opinion that present prices are not likely to be disturbed.

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c
Hoops	4.00c. to 4.25c.
Bands	3.95c.
Cold-fin. rounds and hex	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.60c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100	7.55
	Net per 100 Ft.
Lap-weld. steel boiler tubes, 2-in.	$18.00
4-in.	38.00
Seamless steel b'l'r tubes, 2-in.	19.00
4-in.	39.00

Coke.—For shipment from Ashland, Portsmouth and Indianapolis, by-product foundry coke will remain at $7 per net ton, f.o.b. ovens, during July. Domestic grades also will be unchanged, with egg size at $4.50, ovens, walnut, $3.50, and No. 2 nut, $3. At Detroit, by-product foundry coke is selling this month at $9, delivered in the local switching district, and for outside shipment the average delivered price is $10. Domestic coke in egg and nut sizes continues at $5.50, ovens, for delivery outside of Detroit and at $6, delivered in Detroit. The Louisville & Nashville has purchased 480 tons of beehive foundry coke from a Wise County producer. The Procter & Gamble Co., Cincinnati, is inquiring for 5000 tons of furnace coke for its local plant. Shipments of by-product foundry in June were about 5 per cent less than in May.

Foundry coke prices per net ton deliv'd Cincinnati: By-prod. coke, $9.02; Wise County coke, $7.09 to $7.59; New River coke, $9.09 to $9.59. Freight rates, $2.14 from Ashland, Ky.; $2.59 from Wise County and New River ovens.

Old Material. — Consumers are buying sparingly, although a pick-up in sales is expected in the next two weeks. Cast iron borings, machine shop turnings and cast iron carwheels are down 25c. a ton, but other items are holding firm. Railroad lists closing this week include the New York Central, 8000 tons, Virginian, 800 tons, and Big Four, 2200 tons.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$10.75 to $11.25
Scrap rails for melting	11.25 to 11.75
Loose sheet clippings	8.25 to 8.75
Bundled sheets	9.25 to 9.75
Cast iron borings	7.50 to 8.00
Machine shop turnings	7.00 to 7.50
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.00 to 6.50
Rails for rolling	12.50 to 13.00
No. 1 locomotive tires	12.75 to 13.25
No. 1 railroad wrought	10.00 to 10.50
Short rails	15.75 to 16.25
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	15.25 to 15.75
No. 1 railroad cast	12.75 to 13.25
Burnt cast	7.50 to 8.00
Stove plate	8.25 to 8.75
Brake shoes	9.50 to 10.25
Railroad malleable	11.50 to 12.00
Agricultural malleable	11.00 to 11.50

The National Industrial Conference Board, Inc., 247 Park Avenue, New York, has published a book entitled "Employee Stock Purchase Plans in the United States," which is the result of a comprehensive survey of all the different types of stock ownership systems that are or have been in use in the United States. The volume was prepared by Margaret L. Stecker and assistants under the supervision of the board's economic council. Companies engaged in the making of steel or fabrication of products from steel figure largely in the various plans discussed.

Non-Ferrous Metal Markets

Fairly Large Sales of Tin But Under Those of Preceding Week—Both Tin and Zinc Slightly Higher

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	July 2	June 30	June 29	June 28	June 27
Lake copper, New York	14.87½	14.87½	14.87½	14.87½	14.87½
Electrolytic copper, N. Y.*	14.50	14.50	14.50	14.50	14.50
Straits tin, spot, N. Y.	46.12½	....	47.32½	47.00	46.92½
Lead, New York	6.30	6.30	6.30	6.30	6.30
Lead, St. Louis	6.15	6.15	6.15	6.15	6.15
Zinc, New York	6.55	6.55	6.55	6.55	6.55
Zinc, St. Louis	6.20	6.20	6.20	6.20	6.20

*Refinery quotation; delivered price ¼c. higher.

Copper.—Demand continues exceedingly light both from foreign and domestic consumers and the week has been an uneventful one. Sales have consisted mostly of small lots. Quotations continue very firm, electrolytic copper being quoted at 14.75c., delivered in the Connecticut Valley, with Copper Exporters, Inc., still holding at 15c., c.i.f. European ports. Lake copper is quoted at 14.87½c., delivered, in a quiet but steady market.

Copper Averages.—The average price of Lake copper for the month of June, based on daily quotations in THE IRON AGE, was 14.87½c., delivered. The average price of electrolytic copper was 14.50c., refinery, or 14.75c., delivered in the Connecticut Valley.

Tin.—For the week ended Saturday, June 30, sales of tin were about 1200 tons, which is considerably lighter than the turnover of 1700 tons for the week previous. The interesting feature is that about half of the tin sold was taken by consumers. Toward the end of the week the tone of the market was better because many felt that the bottom had been reached. Today, Monday, this conviction was not quite so firm and the market was dull and weaker, with spot Straits tin quoted at 46.12½c., New York. Prices in London today were considerably lower than a week ago, with spot standard quoted at £211 15s., future standard at £208 7s. 6d., and spot Straits at £214. The Singapore price today was £215 2s. 6d. Statistics for June show total deliveries into consumption in the United States at 6950 tons, with 2148 tons reported in stock and landing on June 30. The world's visible supply on July 1 was 16,231 tons, a decrease of 833 tons from the previous month. This was considered favorable in view of the large Straits shipments in June of 8516 tons. Banca shipments last month were small at 806 tons, and Chinese shipments were only 10 tons, which helped to create

Metals from New York Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	48.50c. to 49.50c.
Tin, bar	50.50c. to 51.50c.
Copper, Lake	15.75c.
Copper, electrolytic	15.50c.
Copper, castings	14.75c.
Zinc, slab	7.25c. to 7.75c.
Lead, American pig	7.25c. to 7.75c.
Lead, bar	9.25c. to 10.25c.
Antimony, Asiatic	12.00c. to 12.50c.
Aluminum No. 1 ingots for remelting (guar'nt'd over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commerc'l grade,	30.00c. to 40.00c.
Solder, ½ and ½	31.50c. to 32.50c.

Metals from Cleveland Warehouse

Delivered Prices Per Lb.

Tin, Straits pig	52.00c.
Tin, bar	56.00c.
Copper, Lake	14.85c.
Copper, electrolytic	14.85c.
Copper, casting	14.00c.
Zinc, slab	7.75c.
Lead, American pig	7.10c.
Antimony, Asiatic	16.00c.
Lead, bar	9.50c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	55.50c.
Solder, ½ and ½	30.75c.

Rolled Metals from New York or Cleveland Warehouse

Delivered Prices, Base Per Lb.

Sheets—	
High brass	19.25c.
Copper, hot rolled	24.00c.
Copper, cold rolled, 14 oz. and heavier	25.75c.
Seamless Tubes—	
Brass	24.12½c.
Copper	25.00c.
Brazed Brass Tubes	27.25c.
Brass Rods	17.00c.

From New York Warehouse

Delivered Prices, Base Per Lb.

Zinc sheets (No. 9), casks	10.00c. to 10.50c.
Zinc sheets, open	11.00c. to 11.50c.

Non-Ferrous Rolled Products

Mill prices on bronze, brass and copper products have not changed since May 25. Zinc sheets have been quoted at 9.25c., base, since the advance of June 7, and lead full sheets at 10c. to 10.25c. since May 29.

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass	19.25c.
Copper, hot rolled	23.50c.
Zinc	9.25c.
Lead (full sheets)	10.00c. to 10.25c.
Seamless Tubes—	
High brass	24.12½c.
Copper	25.00c.
Rods—	
High brass	17.00c.
Naval brass	19.75c.
Wire—	
Copper	16.75c.
High brass	19.75c.
Copper in Rolls	22.50c.
Brazed Brass Tubing	27.25c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of river.

Sheets, 0 to 10 gage, 3 to 30 in. wide	33.00c.
Tubes, base	42.00c.
Machine rods	34.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged customers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	12.625c.	14.00c.
Copper, hvy. and wire	12.50c.	13.50c.
Copper, light and bottoms	10.75c.	12.00c.
Brass, heavy	7.25c.	8.50c.
Brass, light	6.25c.	7.75c.
Hvy. machine composition	9.75c.	11.00c.
No. 1 yel. brass turnings	8.50c.	9.375c.
No. 1 red brass or compos. t'ngs	9.00c.	10.00c.
Lead, heavy	5.00c.	5.50c.
Lead, tea	4.00c.	4.50c.
Zinc	3.00c.	3.50c.
Sheet aluminum	12.75c.	14.50c.
Cast aluminum	12.50c.	14.00c.

Rolled Metals, f.o.b. Chicago Warehouse

(Prices Cover Trucking to Consumers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	19.25c.
Copper, hot rolled	23.50c.
Copper, cold rolled, 14 oz. and heavier	25.75c.
Zinc	10.00c.
Lead, wide	9.75c.
Seamless Tubes—	
Brass	25.62½c.
Copper	26.50c.
Brazed Brass Tubes	27.25c.
Brass Rods	17.00c.

a decrease in the visible supply. It is reported that the Banca shipments for the first half of July will be more than the June total. Another report today is that Straits shipments in July will reach 9000 tons, a factor in the weaker tone of the market today. Sales in the Far East, which have been conspicuous recently, were light last week, except on June 29, when they were about 400 tons.

Lead.—Prices are unchanged and the market has been quiet, with demand only moderate. The quotation of the leading interest continues at 6.30c., New York, as the contract price, with 6.15c., St. Louis, the prevailing level in the outside market.

Zinc.—Advance orders on the books of producers are reported to be the lowest in many months. It is pointed out that buyers of prime Western zinc are pursuing the familiar hand-to-mouth policy in the expectation of lower prices. Producers are making no concessions, quotations having advanced five points to 6.20c., East St. Louis, or 6.55c., New York. Both demand and inquiry are not large. Ore at Joplin was unchanged Saturday at $40 a ton, at which about 7000 tons was sold, with production about 11,000 tons, both practically unchanged from the week previous.

Nickel.—Wholesale lots of ingot nickel are quoted unchanged at 35c., with shot nickel at 36c. and electrolytic nickel at 37c. per lb.

Antimony. — Chinese metal is quoted unchanged at 9.50c. to 9.75c., New York, for all positions, with demand light.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. per lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, July 2.—Sales are individually small. Prices for copper are strong, but quotations on tin and antimony are lower. The old metal market is dull.

Prices, per lb., in carload lots: Lake copper, 14.75c.; tin, 48.50c.; lead, 6.25c.; zinc, 6.30c.; in less-than-carload lots, antimony, 11c. On old metals we quote copper wire, crucible shapes and copper clips, 10.75c.; copper bottoms, 9.75c.; red brass, 9.50c.; yellow brass, 7.25c.; lead pipe, 4.75c.; zinc, 3.50c.; pewter, No. 1, 30c.; tin foil, 36.25c.; block tin, 45.25c.; aluminum, 12c.; all being dealers' prices for less-than-carload lots.

Fabricated Structural Steel

Miscellaneous New York Jobs Take Nearly Half of 42,000 Tons Awarded—New Projects Will Require 28,900 Tons

MORE than 15,000 tons of the 42,000 tons of fabricated structural steel reported placed in the last week will go for miscellaneous work in New York, principally apartment buildings. Other large jobs placed were a power house at Mount Holly, N. C., calling for 3700 tons, and a Chicago high school, which will take 3500 tons. Outstanding among new projects, which call for 28,900 tons, are 4200 tons in a bridge for the Texas & Pacific Railroad, 3500 tons for a high school in Brooklyn and 3000 tons for a New York apartment building. Awards follow:

BOSTON & MAINE RAILROAD, 400 tons, bridges, to Boston Bridge Works, Inc.,

STATE OF VERMONT, 200 tons, highway bridges, to Bethlehem Steel Co.

NEW YORK, 13,700 tons in the following awards as reported to the Structural Steel Board of Trade: Addition to Lord's Court Building at Exchange Place and William Street, bakery in Westmoreland Avenue at White Plains, N. Y., and apartment buildings at Madison Avenue and Seventieth Street, 171 East Seventy-ninth Street, 343 East Fifty-seventh Street, 317 East Fifty-seventh Street, Lexington Avenue and Seventy-fifth Street, Madison Avenue and Seventy-fifth Street, 200 East Sixty-eighth Street and 36 West Sixty-seventh Street, to Hedden Iron Construction Co.; alteration to Mechanics Bank at Court and Montague Streets in Brooklyn, synagogue at 721 West Eighty-third Street, and Brooklyn Eye and Ear Hospital at Grand Avenue and Cumberland Street, to George A. Just Co.; Roerich Museum at Riverside Drive and 103rd Street, to Taylor-Fichter Steel Construction Co.

NEW YORK, 500 tons, professional building on East Sixty-first Street, to Bethlehem Steel Co.

BROOKLYN, 1000 tons, theater, to Hedden Iron Construction Co.

JERSEY CITY, 500 tons, building for Pennsylvania Railroad, to Belmont Iron Works.

DEEPWATER, N. J., 6000 tons, power station for United Gas Improvement Co., Philadelphia, to McClintic-Marshall Co.

ALLENTOWN, PA., 180 tons, Bell Telephone building, to Lehigh Structural Steel Co.

PHILADELPHIA, 660 tons, dormitories at Girard College, to American Bridge Co.

PHILADELPHIA, 645 tons, building for Drexel Institute, to American Bridge Co.

STATE OF NEW JERSEY, 135 tons, bridge, to Phoenix Bridge Co.

BALTIMORE & OHIO RAILROAD, 250 tons, bridges, to American Bridge Co.

SPARTANBURG, S. C., 1000 tons, building for Drayton Mills, to Carolina Iron & Steel Co.

MOUNT HOLLY, N. C., 3700 tons, power house for Duke Power Co., to Ingalls Iron Works, Birmingham.

WATERSVILLE, N. C., 250 tons, hydroelectric plant for Phoenix Utility Co., to Ingalls Iron Works Co.

LOUISVILLE, KY., 250 tons, caissons for bridge across Ohio River, to St. Louis Structural Steel Co.

PITTSBURGH, 1100 tons, Pittsburgh Coal Co. washer building, to Pittsburgh Engineering & Construction Corporation.

MASSILLON, OHIO, 120 tons, manufacturing building for Central Alloy Steel Corporation, to Massillon Bridge & Structural Co.

TOLEDO, OHIO, 300 tons, Nurses Home, to American Bridge Co.

IRONWOOD, MICH., 500 tons, stockpile trestle and head frame for Montreal Mining Co., to Worden-Allen Co.

FORDSON, MICH., 520 tons, soaking pit building for Ford Motor Co., to Massillon Bridge & Structural Co.

MADISON, WIS., 300 tons, motor-bus terminal and headquarters building for Wisconsin Power & Light Co., to Worden-Allen Co.

MENOMINEE, WIS., 1000 tons, bridge, to Wisconsin Bridge Co.

CHICAGO, 1600 tons, Marshall Field Estate development, to Duffin Iron Co., local.

CHICAGO, 3500 tons, Austin High School, to McClintic-Marshall Co.

POWERTON, ILL., 150 tons, building for Super Power Co., to Mississippi Valley Structural Steel Co.

LAPORTE, IND., 200 tons, building for United States Slicing Machine Co., to American Bridge Co.

JONES COUNTY, IOWA, 130 tons, highway bridge, to unnamed bidder.

MINNEAPOLIS, 140 tons, building for Zinsmater Baking Co., to Minneapolis Steel & Machinery Co.

KANSAS CITY, MO., 2200 tons, Chevrolet assembly plant, to Kansas City Structural Steel Co.

GARLAND CITY, ARK., 500 tons, bridge for St. Louis Southwestern, to Virginia Bridge & Iron Co.

SAN FRANCISCO, 270 tons, Dollar Building addition, to Judson-Pacific Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

SACO, ME., 1500 tons, two Boston & Maine bridges.

SALMON FALLS, ME., 500 tons, Boston & Maine bridge.

HAVERHILL, MASS., 1000 tons, Boston & Maine Railroad bridge.

BOSTON, 200 tons, Packard Motor Co. service station.

STATE OF VERMONT, 500 tons, highway bridges.

HARTFORD, CONN., 600 tons, Memorial Hall.

NEW YORK, 500 tons, building for American Bank Note Co. at Hunt's Point.

NEW YORK, 3000 tons, apartment building at Park Avenue and Fifty-eighth Street.

NEW YORK, 2500 tons, hospital at 471 Central Park West.

NEW YORK, 2000 tons, apartment building at Park Avenue and Seventy-first Street.

NEW YORK, 1500 tons, apartment building at Central Park West and Ninety-fourth Street.

NEW YORK, 1000 tons, apartment building in East End Avenue.

NEW YORK, 500 tons, building for Kresge & Co. on Third Avenue.

BROOKLYN, 3500 tons, Samuel Tilden High School.

STATE OF NEW YORK, 300 tons, highway bridges.

ONEONTA, N. Y., 500 tons, building for Hartwick College.

BUFFALO, 1000 tons, Bailey Avenue bridge; bids taken.

CLEVELAND, 200 tons, building for Federal Foundry Supply Co.

MELVILLE, LA., 4200 tons, bridge for Texas & Pacific Railroad.

CHICAGO, 760 tons, building for Miehle Printing Press & Mfg. Co.

CHICAGO, 400 tons, Kresge store.

CHICAGO, 600 tons, printing plant for R. Law.

MISSOURI PACIFIC RAILROAD, 500 tons, bridge.

OMAHA, NEB., 500 tons, addition to office building of Union Pacific Railroad.

OKLAHOMA CITY, OKLA., 650 tons, highway bridge.

Japan Expands in Manchuria

To Build Oil Shale Recovery Plant at Fushun—Anshan Works Projects Blast Furnace

IN view of the political situation in China and the prospects of an early difference of opinion between the Chinese Nationalists and the Japanese Government over control in Manchuria, something of Japanese investment in that territory and need for its resources is perhaps noteworthy.

The South Manchuria Railway Co., the most important Japanese interest in Manchuria, has recently received reports on the present status of oil shale and the iron industry of that country, from which the following has been taken: The annual production of crude oil in Japan proper amounts to only about 280,000 to 290,000 tons. The production of oil from shale excavated in Manchuria would mean, it appears, the prolongation of the life of Japan's crude oil production by 22 to 23 years, as the average consumption of the country is 1,700,000 tons of heavy oil.

The shale deposit at the Fushun collieries amounts to about 5,400,000,000 tons, with an estimated crude oil content of 5.5 per cent, and it is calculated that this deposit would provide a total of about 200,000,000 tons of heavy oil. This shale is not subject to oil recovery at present, but in January of this year it was decided to establish an oil refining plant at Fushun with an annual capacity for treating 1,360,000 tons of oil shale, about 4000 tons a day. Preparations are proceeding for completing this plant and by the end of July, 1929, the plant is expected to be completed. Meanwhile orders are being placed for machinery required in the various departments of the plant and for other construction work.

Anshan Works Expanding

To reduce Japan's dependence upon other countries for supplies of iron, a program of expansion has been projected at the Anshan Steel Works in Manchuria, a plant owned by the South Manchuria Railway Co. An appropriation of 5,500,000 yen ($2,640,000) has been made for construction in 1928 and 1929, which will increase the production of the plant from 200,000 tons of pig iron annually to about 280,000 tons.

The new construction includes the erection of a modern 500-ton blast furnace in addition to the two 300-ton furnaces now in operation. The old furnaces will have their capacities increased to 350 tons a day.

In this connection, it is noteworthy that while Japan has some coal, although not sufficient for all requirements, there is almost no iron ore available in the country. To supply the demand, iron ore is imported from Central China and the South Seas. The Anshan district in Manchuria, however, is exceedingly rich in iron ore with estimated deposits of 300,000,000 tons with an average metal content of 35 per cent iron.

REINFORCING STEEL

OUTSTANDING among new projects totaling 5000 tons, which have been reported during the last week, is a drainage improvement job at Los Angeles requiring 2300 tons. The following awards involve about 2300 tons:

BOSTON, 400 tons, North Station, to Barker Steel Co.

DEDHAM, MASS., 125 tons, bridge, to Barker Steel Co.

FALL RIVER, MASS., 100 tons, coal pocket, to Barker Steel Co.

LONG ISLAND CITY, N. Y., 250 tons, building for Bayonne Steel Ceiling Co., to Truscon Steel Co.

CINCINNATI, 188 tons, addition to plant of Andrew Juergens Co., to Pollak Steel Co.

DETROIT, 133 tons, building for Swift Packing Co., to Pollak Steel Co.

SEWICKLEY, PA., 150 tons, Pennsylvania Railroad work, to Kalman Steel Co.

CHICAGO, 280 tons, Chicago Woman's Club, to an unnamed bidder.

CHICAGO, 150 tons, Sacred Heart Academy, to Barton Spiderweb System.

CHICAGO, 125 tons, apartment building on Sherwin Avenue, to Concrete Engineering Co.

CHICAGO, 200 tons, Chapin Studios, to Joseph T. Ryerson & Son.

MASON CITY, IOWA, 100 tons of rail steel bars, industrial plant, to Republic Iron & Steel Co.

CHICAGO, 120 tons of rail steel bars, Chicago Arms apartment building, to Concrete Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

BOSTON, 300 tons, Packard Motor Co. service station addition.

CAMBRIDGE, MASS., 150 tons, hospital.

NEW YORK, 100 tons, Queens Vocation School at Queens Village, L. I.

CHICAGO, 100 tons, garage at Twenty-sixth Street and Michigan Avenue.

CHICAGO, 100 tons, factory building on Ogden Avenue.

CHICAGO, 250 tons, garage at Wabash Avenue and Harrison Street; Alfred S. Alschuler, architect.

CHICAGO, 300 tons, printing plant for William J. Igoe.

CHICAGO, 450 tons, Sheridan Towers.

CHICAGO, 450 tons, Harmon sports arena.

MILWAUKEE, 135 tons, bridge; bids close July 12.

ST. LOUIS, 380 tons, hotel at Twelfth and Locust Streets; McKelvey-Carter Construction Co., general contractors.

LOS ANGELES, 2288 tons, Drainage Improvement District No. 26; bids July 16.

British Market Depressed and Mills Urge Government Aid

LONDON, ENGLAND, June 22.—With the exception of one or two markets, particularly tin plate, there has been no improvement in the iron and steel industry. British steel makers are still pressing for some form of government aid, especially urging the inclusion of iron and steel under the Safeguarding of Industries act, and in this connection a deputation of steel makers waited on the Prime Minister on June 20. It was pointed out that the industry is operating on a day-to-day basis of 60 to 70 per cent of capacity, that of the material used in ship construction only about 20 per cent is foreign steel, and that upward of 80 per cent of the shipbuilders have adopted the British steel makers' rebate offer. Mr. Baldwin, however, again made it quite clear that the policy of the government would not be changed during the existence of the present Parliament, and referred the deputation to the government's relief of rates plan. At the same time the Chancellor of the Exchequer received a similar deputation from the North East Coast, and promised to place the request before the Cabinet.

Meanwhile, demand is generally poor. With the exception of the Cleveland furnaces, the pig iron market is depressed. Cleveland makers, fortunately, have fairly well filled order books, but the volume of new business is not in proportion to the orders being executed.

In other districts, the situation is worse, and in Scotland three furnaces are being blown out, making less than 30 blast furnaces in blast out of a total of 100. Hematite iron is also depressed and makers are burdened with heavy stocks. On the northeast coast one more furnace has been blown out. Curtailment of output is the result of poor demand, as foreign iron is no longer competitive.

In semi-finished material conditions are better, as the Welsh makers of sheet bars are fully occupied in supplying tin plate mills and the market is strong because of the shortage of steel scrap.

The heavy steel industries are in a worse position than for some time. New shipbuilding contracts are negligible, and export demand for plates and shapes is at a low level. Lighter material is moving fairly freely, but the bulk of the tonnage needed is for the heavy mills. Business in Continental material has been on a small scale. What business has been done appears to have been transacted by the Continental mills direct with overseas buyers.

The David Joseph Co., Cincinnati scrap iron dealer, has decided to abandon its Cincinnati yards and is dismantling its equipment there. It will retain its yards at Youngstown, Portsmouth, Ohio, and Ashland, Ky.

PERSONAL

BLAINE S. SMITH has resigned as vice-president of the Universal Portland Cement Co. (Steel Corporation subsidiary) to become president of the Pennsylvania-Dixie Cement Corporation, succeeding John A. Miller, who becomes chairman of the board. Mr. Smith had been connected with the Universal Portland Cement Co. since 1908. In 1915 he was made general sales manager and later vice-president.

—

COL. HARRY C. WILDER, on Aug. 1, will resign as director of sales for the Northern New York Utilities, Inc., Rome, N. Y., and will join the Rome Wire Co. in charge of public utilities sales.

—

T. H. SCAFFE, for some time associated with the Detroit branch of the United States Electrical Tool Co., Cincinnati, has been appointed district manager in that city. R. N. Brayer, previously identified with the Boyer-Campbell Co., Detroit jobber, has been added to the Detroit personnel of the Electrical Tool company.

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A. J. FORSCHNER, for some time sales manager in charge of the sand, gravel and stone department of the R. H. Beaumont Co., Philadelphia, has been appointed vice-president of the Atlas Conveyor Co., Inc., 20 South Fifteenth Street, Philadelphia. He was formerly president of the Alfred J. Forschner Co., distributer of power scrapers and slack line excavators. The Atlas company plans to extend its activities to include the manufacture of drag scrapers for excavating sand and gravel.

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FRANCIS A. EMMONS, sales and advertising manager of the Foote Brothers Gear & Machine Co., Chicago, has been elected president of the Engineering Advertisers' Association of Chicago.

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E. T. CORBUS, formerly with Edgar T. Ward's Sons Co., Boston, is now located at the Pittsburgh office, and has been succeeded in Boston by J. A. Parsons.

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W. H. GERHAUSER has been elected president of the American Shipbuilding Co., Cleveland, to succeed Alfred G. Smith. Mr. Gerhauser has been vice-president and secretary of the company.

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M. F. LIEBERMAN, Ambridge, Pa., was elected president of the Sheet Metal Contractors' Association of Pennsylvania at the annual convention, held at Erie, Pa. Emil Bordt, Lancaster, Pa., was named vice-president; Robert Warren, Erie, secretary, and Harry G. Hartline, Erie, treasurer. The 1929 convention will be at Lancaster.

H. A. WEBER, who has been district manager of sales in Boston for the Weirton Steel Co., has been transferred to New York as assistant district manager of sales in that office, and W. E. Snellgrove has been made Boston district manager of sales.

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E. T. WEIR, who has been elected a director American Iron and Steel Institute, has been president Weirton Steel Co., Weirton, W. Va., since 1908, and has been active in the steel industry since 1890, when as a boy he entered the employ of the Braddock Wire Co., Braddock, Pa. Later he went to work for the Oliver Wire Co., Pittsburgh, and remained with that company until 1901, when he joined

ERNEST T. WEIR

the American Tin Plate Co., first as manager of its Monongahela works and later at its Monessen mills. In 1905, in association with J. R. Phillips, he organized the Phillips Sheet & Tin Plate Co. at Clarksburg, W. Va., of which he became president in 1908, the name of the company having been changed to the Weirton Steel Co. in 1918.

He is president of the Bank of Weirton, and a director of the Bank of Pittsburgh, National Association; Edgewater Steel Co., Oakmont, Pa.; Hanna Ore Mining Co., Cleveland; Redstone Coal & Coke Co., Brownsville, Pa.; Weirton Improvement Co.; Oak Hill Supply Co., located in the Monongahela Valley, and the Peoples Bank of Holidays Cove, W. Va. He is a member of United States Chamber of Commerce, the Pittsburgh Chamber of Commerce, American Iron and Steel Institute, Engineers' Society of Western Pennsylvania, Civic Club of Allegheny County, and the West Virginia Manufacturers' Association.

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R. C. WALKER, formerly manager of the Meyer Furnace Co., Peoria, Ill., has been elected president and general manager of the Midland Furnace Co., which is erecting a plant at Columbus, Ohio.

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E. J. KEARNEY, secretary and treasurer of the Kearney & Trecker Corporation, Milwaukee, sailed for Europe on June 22.

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MAURICE A. OUDIN, vice-president of the International General Electric Company, Inc., who has returned from an extended visit in Europe, was decorated with the Order of Commander of the Crown of Italy by the King of Italy in recognition of his good offices in behalf of a closer international relationship and of the specific benefit to the engineering profession of Italy.

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L. P. LINDEMUTH, of Carney & Lindemuth, consulting engineers, 40 Wall Street, New York, has returned to the United States after nearly a year's absence in Australia. While there he was open-hearth consultant at the steel works of the Broken Hill Proprietary Co. at Newcastle, where L. P. Ross, formerly in charge of the furnaces at Wharton, N. J., has been carrying on blast furnace construction and operation for the Broken Hill company. Mr. Lindemuth sailed the portion of his return trip between Newcastle and the Fiji Islands in a 20-ton ketch, being accompanied by Stewart Keightley, for a number of years an officer in the Royal Australian Navy. The two started from Newcastle on March 3. The original plan was to make the entire voyage in the ketch from Newcastle to San Francisco by way of New Caledonia, Loyalty Islands, Southern New Hebrides, Fiji, Tonga, Samoa, Union Islands, Phoenix Islands and Honolulu.

—

J. RAMSEY SPEER has resigned the presidency of the Mackintosh-Hemphill Co., Pittsburgh. F. Hughes Moyer, vice-president in charge of operations, has been made executive vice-president and is to direct the affairs of the company. It is understood that new interests have become associated with the management.

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WILLIAM J. OLCOTT has resigned as president of the Oliver Iron Mining Co., Duluth, operator of the Lake Superior iron mines of the United States Steel Corporation. He has been president of the company 19 years. Pentecost Mitchell, for many years a vice-president of the Oliver company and its operating head, has succeeded Mr. Olcott as president. J. H. McLean, a vice-president of the Oliver company, has also resigned. Continued poor health is given as the reason for the resignation of both officials. Prior to his connection with the Oliver Iron Mining Co., Mr. Olcott was general manager of the Lake Superior Consolidated Ore Mines, which were absorbed by the Oliver company.

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STUART SMITH, formerly president of the Stuart S. Smith Co., San Francisco, has been appointed manager of the construction equipment division of the Jenison Machinery Co., recently

formed to succeed the northern California division of the Smith-Booth-Usher Co. He will serve as vice-president and director of the company and will have headquarters at 58 Fremont Street, San Francisco.

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C. S. PROUDFOOT, Vanadium Corporation of America, Niagara Falls, N. Y., was elected president of the Association of Iron and Steel Electrical Engineers at the association's convention held recently in Chicago. Other officers elected were F. W. Cramer, Bethlehem Steel Co., Johnstown, Pa., vice-president; James Farrington, Wheeling Steel Corporation, Steubenville, Ohio, treasurer, and A. G. Place, Youngstown Sheet & Tube Co., Youngstown, secretary.

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F. L. STONE has been appointed general sales manager of the Universal Portland Cement Co., Chicago, succeeding Blaine S. Smith who recently resigned to become president of the Pennsylvania-Dixie Cement Corporation. Mr. Stone started as a salesman with the Universal company 18 years ago. For the last ten years he has been assistant general sales manager.

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F. C. YOUNG, who has been Cleveland district sales manager for the Union Drawn Steel Co., Beaver Falls, Pa., has been appointed assistant general sales manager of that company and has been succeeded in Cleveland by A. C. Geldner, who has been connected with the Cleveland sales office.

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R. S. DUTTON, manager of sales for Pickands, Brown & Co., Chicago, has returned from a two months' vacation in southern Europe.

Institute Medal Committees Appointed

Rules governing the award of the Gary Memorial Medal and the American Iron and Steel Institute Medal, both of which were authorized at the last meeting of the institute, have been approved. The award of the Gary medal (gold), which will be awarded each year for outstanding achievement in the iron and steel industry, will be made by the directors of the institute upon recommendation of the following board of award: James A. Campbell, Willis L. King, James A. Farrell, Samuel Mather and Charles M. Schwab.

The American Iron and Steel Institute Medal, of bronze, will be awarded annually by the directors, on recommendation of a committee on arrangements, for a paper, read before the institute, having special merit and importance in connection with iron and steel manufacture. The committee on arrangements includes: James A. Farrell, chairman; James A. Burden, Eugene G. Grace, E. A. S. Clarke and John A. Topping.

OBITUARY

HJALMAR OSTERBERG, for many years special agent in the tin plate division of the Wheeling Steel Corporation, Wheeling, W. Va., died on June 25, aged 59 years. He was born in Sweden and came to this country when very young, obtaining work in the sheet and tin plate mills in the Pittsburgh district and finally becoming associated with the American Sheet & Tin Plate Co. Later he helped to organize the Osterberg Sheet & Tin Plate Co., Waynesburg, Pa. When that enterprise was abandoned in 1913, he became identified with the Wheeling Sheet & Tin Plate Co. as special sales representative, and had been continuously associated with that company through its various mergers into the Wheeling Steel Corporation.

—

JAMES S. CAFFREY, one of the founders of the Smith & Caffrey Co., Syracuse, N. Y., died in that city on June 30, aged 75 years. William B. Smith, his associate in the formation of the firm 35 years ago, died on March 24. The company took over the old Phoenix foundry in 1911 and Mr. Caffrey became vice-president, having served in that capacity until his retirement five years ago. He was born in Providence, R. I., and located at Syracuse 50 years ago.

Metal Studies by Testing Society

(*Concluded from page* 30)

num-base die castings. Results have already been received on 15,000 individual test pieces—in fact the data are so profuse that definite recommendations were withheld pending study by statistical methods.

Before active testing was commenced, much preparatory discussion was necessary to secure agreement on the list of alloys, and the size and shape of tension, impact and corrosion specimens to preserve the correct relation of surface to cross-section so important in die casting. Twelve aluminum-base alloys have been produced to the following chemical specifications:

Aluminum-Base Die Casting Alloys

Number	Copper, Per Cent	Silicon, Per Cent	Nickel, Per Cent	Iron, Per Cent	Aluminum, Per Cent, Balance
I	4	..	..	1½ to 2	94
II	10	..	..	1½ to 2	88
III	14	..	..	1½ to 2	84
IV	..	5	..	1½ to 2	93
V	..	13	..	1½ to 2	85
VI	2	3	..	1½ to 2	93
VII	4	5	..	1½ to 2	89
VIII	1½	¾	2¼	1½ to 2	94
IX	4	1½	4	1½ to 2	89
X	..	2	5	1½ to 2	91
XI	2	8	..	1½ to 2	88
XII	8	1	..	1½ to 2	89

It was also necessary to devise a usable method of hardness testing, and the committee has met this by a special Rockwell "E" scale, using ⅛-in. steel ball penetrator, and minor and major loads of 10 kg. and 100 kg., respectively.

At the Atlantic City meeting it was agreed to extend the program to cover zinc-base die castings, wherein various grades of zinc, ranging from the relatively impure Prime Western to electrolytic zinc of 99.90 per cent purity, Horsehead zinc of 99.94 per cent purity, and a special electrolytic zinc of 99.97 or 99.98 per cent. Such tests, especially the corrosion exposure tests to be arranged, will do much to settle the question whether the instability of zinc-base die castings is due to lead and cadmium impurities.

Eventually it is hoped to have ample information about commercial die-cast metal, and its variation piece to piece and factory to factory, which will enable a specification to be written. While it is recognized that in die casting, as in all types of casting, a test piece gives merely a general indication of the quality of the metal in the actual casting, it is thought that when producing large quantities of important castings a special block can be slipped into the die at intervals and test pieces cast which will be of much control value to both producer and purchaser.

May Organize Lead Institute

Important interests in the lead industry have taken steps to organize a lead institute, similar in character to the Copper Institute. Discussions thus far have been informal, but a meeting of the leading interests may be held this month, at which details will be worked out with the idea of forming the institute in the fall.

One of the chief functions of the new organization will be to gather consumption data and other statistics to keep producers informed of the conditions of forward orders. Production statistics are already available.

Among the large corporations interested are the National Lead Co., the American Smelting & Refining Co., and the Western Electric Co., all of which are understood to have signified their intention of joining such an organization.

Unite to Cut Distribution Costs

(*Concluded from page* 18)

don't care what they pay that is reasonable, so long as they are assured that they don't pay a greater price than anyone else."

As a method for preventing ruthless price cutting, Mr. Schwab suggested the appointment of a committee to act as an arbiter, not so much to say what shall be made, but to watch what is being done. "Each company should report to that committee monthly or quarterly how much business he has done. Nothing need be said about price, but the monthly report of business done should be insisted upon. Occasionally someone will report more business than his position and the statistics of the past would warrant. Now if he has given his word that he is going to cooperate and does that, he is not cooperating and therefore is not a man to be taken into confidence as one who is doing a legitimate business.

"What does cooperation mean? Fifty men sit together and say that they are going to cooperate. The next day a good order comes along and someone goes out and takes it regardless of anybody's cooperation. If I understand the law correctly there is no reason why someone might say that the price of bolts and nuts is so-and-so. If other manufacturers want to cooperate there is nothing in the laws, as I understand them, that doesn't say that I can sell my goods at the same prices publicly announced that they will sell theirs. It is a question of personal confidence and relation with each other. You can go and cut your prices to get business if you like, but you will find when the end of the year comes round that you have not a greater percentage of the business than you would have had if you had gone ahead pursuing the normal tone and price of your business."

The progress made by trade association in bettering business conditions was emphasized by Gilbert H. Montague, general counsel National Welded Chain Association of the United States, in a talk on "Recent Steps in Business Self-Government." This progress, he pointed out, has been possible largely since 1925 when the Supreme Court rendered certain decisions making it possible for manufacturers to organize for the purpose of exchanging views and ideas concerning the conduct of their respective businesses. "Since that time," said Mr. Montague, "trade associations have grown to be second only to the national Government as governing bodies."

Committees Formed to Promote Distribution Plan

In the discussion which accompanied each session, it was clearly brought out that manufacturers and jobbers alike are heartily in favor of a distribution plan either similar to or patterned after the plan now used by the bolt, nut and rivet manufacturers. This sentiment was brought out by some 40 men representing jobbers in all parts of the country and manufacturers of a score or more distinct lines of products.

In order to investigate more thoroughly the possibilities of introducing the distribution plan used by the bolt and nut industry into other fields of manufacture, George Puchta, Queen City Supply Co., Cincinnati, suggested that two committees be formed, one to be made up of one representative of each of the several manufacturing industries represented at the meeting and the other to be composed of a number of the jobbers' chairmen from the various districts which have already been organized through the efforts of the bolt and nut industry. It was decided that these two committees should meet together for the purpose of considering plans for placing distribution on a more profitable basis. The personnel of these committees is included elsewhere in this story.

The possibility of arriving at manufacturing economies by comparing costs with those of competitors was stressed by Mr. Schwab. "You will get all the advantages which the Steel Corporation has by reason of its variety of works, if you will just adopt the things they have naturally adopted by consolidation. No one would question the legality of that. If that is a great measure of economy and a great economic step forward, why is it not equally right for you who dispose of your products to discuss prices and conditions with reference to distribution? American manufacturers don't want to break the present law, but our business justifies our existence with the present law."

Business Analysis and Forecast

(*Concluded from page* 27)

of conditions represented by the P-V Line has been more quickly effective in the steel industry than was the case in 1923, the decline in ingot production coming about as soon after the decline in the P-V Line as it did in the early portions of 1924 and 1925. Parallelism between the two indexes is not sufficiently close to enable precise forecasts, but a further decline in production at a somewhat greater rate than usual for the season is indicated for the next two or three months.

The rate of changes in unfilled steel orders is an excellent barometer of the trend of business, its direction, or rise and fall, generally anticipating the course that business will take two or three months subsequently. The curve may hold close to its present low level for four or five months as it did in 1925.

Two of the great key industries of the country made a favorable showing in May. The automobile and building industries both increased more than usual for the month and were more active than in May of either of the two preceding years. If one were to allow for a normal rate of growth over a period of years, both industries would show activity at about the normal level. These facts explain both the well sustained volume of steel production and the large total volume of industrial activity. They do not, however, agree with the relatively unfavorable showing of railroad freight traffic, which runs considerably behind a year ago, and this fact leads us to infer that the automobile and building industries are somewhat ahead of the condition of the total for all industries.

The normal seasonal trend in both industries is rather sharply downward from now on, the decline carrying through September for building and through December for automobile production. In view of the current high money rates, some degree of political uncertainty, and the probable sagging trend of general business, it is probable that the two industries will fall off during the summer to a somewhat greater extent than usual for the season.

We Expect a Minimum Cost

(*Concluded from page* 7)

many manufacturers. They are suspicious that the products are sold below cost or without a fair margin of profit. I rather think that just the opposite is the fact. In general, the manufacturer who is forward looking and is quoting low prices usually has a very satisfactory margin of profit above his cost, as his annual statements show.

There is no reason to believe that the present tendency of lower selling prices will not continue and that we will not have this continual process of cost reduction and lower and lower selling prices. It is altogether proper that this tendency should continue, as it is on this basis that the prosperity of this country is based. Lower costs mean the possibility of each of us having more things, and that, after all, is what material prosperity is.

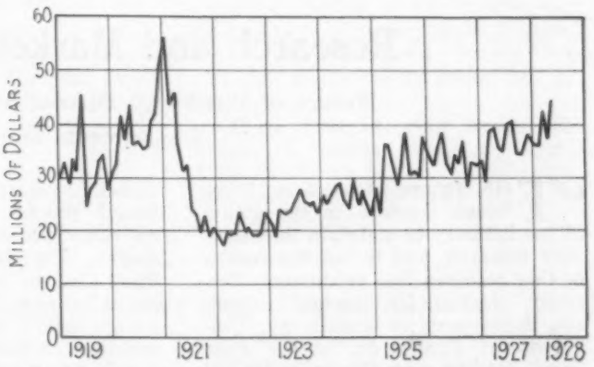
Fifth Largest Machinery Exports

May Total Was Exceeded in Only Four Previous Months, All of Which Were More Than Seven Years Ago

WASHINGTON, June 28.—Making a gain of $7,294,784, or a little more than 19 per cent, exports of machinery in May were valued at $44,670,652, against $37,375,868 in April. For May of last year the value was $35,791,991. For the five months ended with May, 1928, the value was $196,649,126, an increase of $19,117,419 or approximately 10¾ per cent over the total of $177,531,707 for the corresponding period of last year. Only four previous months have exceeded the shipments made in May: June, 1919, with $46,420,000; December, 1920, with $50,322,000; January, 1921, with $56,706,000; March, 1921, with $45,796,000.

Exports of industrial machinery in May accounted to a substantial degree for the increased foreign shipments, being valued at $20,274,976, a gain of approximately 17 per cent over exports of this class of equipment in April, valued at $17,412,396. In May of last year exports of industrial machinery were valued at $16,304,363. For the five months ended with May, 1928, an increase of almost $5,000,000 was made over exports for the corresponding period of 1927, the respective totals having been $89,173,624 and $84,291,019.

Exports of power-driven metal-working machinery in May were valued at $1,970,348, compared with $1,827,938 in April, and $1,494,498 in May of last year. For the five months ended with May the value was $9,788,382, against $7,231,825 for the corresponding period of last year. Exports of other metal-working machinery in May were valued at $577,610, against $397,842 in May of last year. For the five months ended with May of the present and last



Steady Gain in Machinery Exports Is Shown, After the Collapse of the 1920 Boom Had Spent Itself

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	May		Five Months Ended May	
	1928	1927	1928	1927
Locomotives	$125	$56	$904	$3,598
Other steam engines	221	193	452	711
Boilers	140	159	453	828
Accessories and parts	103	61	301	210
Automobile engines	1,714	1,333	6,876	6,063
Other internal combustion engines	712	648	3,040	2,968
Accessories and parts	388	256	1,572	1,670
Electric locomotives	368	25	939	463
Excavating machinery	929	337	3,525	1,884
Concrete mixers	117	124	445	532
Road-making machinery	274	306	894	927
Elevators and elevator machinery	414	410	1,775	2,036
Mining and quarrying machinery	1,429	1,105	5,538	6,263
Oil-well machinery	1,107	1,245	5,635	8,798
Pumps	611	599	2,784	2,730
Bending and power presses	102	134	633	516
Power hammers	208	320	310	361
Power-driven metal-working machines (a)	1,970	1,494	9,788	7,232
Other metal-working machinery and parts	577	398	2,459	1,909
Textile machinery	1,315	805	5,665	4,318
Sewing machines	820	678	3,700	3,937
Shoe machinery	149	144	774	614
Flour-mill and gristmill machinery	41	61	206	195
Sugar-mill machinery	310	202	190	1,112
Paper and pulp mill mach'ery	253	308	1,505	1,996
Sawmill machinery	82	57	384	311
Other woodworking mach'ery	168	151	764	566
Refrigerating and ice-making machinery	1,011	926	3,376	3,239
Air compressors	727	547	2,706	2,464
Typewriters	2,371	1,801	9,797	8,979
Power laundry machinery	148	84	482	659
Typesetting machines	450	275	1,894	1,631
Printing presses	730	424	2,642	2,480
Agricultural machinery and implements	10,144	7,481	43,719	34,391
All other machinery and parts	14,443	12,645	70,522	60,941
Total	$44,671	$35,792	$196,649	$177,532

(a) Principal items detailed in another table.

Imports of Machinery into the United States

(By Value)

	May		Five Months Ended May	
	1928	1927	1928	1927
Metal-working machine tools	$90,182	$56,917	$269,491	$244,256
Agricultural machinery and implements	507,778	536,118	2,579,811	3,124,228
Electrical machinery and apparatus	202,991	312,455	960,486	1,255,408
Other power-generating machinery	40,482	16,491	72,552	38,678
Other industrial machinery	931,932	1,516,578	3,647,659	4,166,026
Vehicles except agricultural	256,528	225,384	1,176,884	970,034
Total	$2,029,893	$2,663,943	$8,706,883	$9,798,630

Exports of Power-Driven Metal-Working Machinery

	May, 1928		April, 1928	
	No.	Value	No.	Value
Engine lathes	63	$126,294	39	$78,449
Turret lathes	60	110,497	41	56,602
Other lathes	41	140,333	125	159,525
Vertical boring mills and chucking machines	17	42,563	8	7,720
Thread-cutting and automatic screw machines	63	80,635	64	78,357
Knee and column type milling machines	22	49,293	19	36,746
Other milling machines	34	88,974	43	109,522
Gear-cutting machines	43	101,770	30	64,481
Vertical drilling machines	23	13,112	62	38,491
Radial drilling machines	10	21,913	8	39,574
Other drilling machines	72	26,231	71	32,241
Planers and shapers	24	63,348	46	84,802
External cylindrical grinding machines	77	202,345	59	143,088
Internal grinding machines	95	90,068	37	43,956
Metal-working tool-sharpening machines	80	77,733	44	24,790
Total	724	$1,235,109	696	$998,344

year the values were $2,458,567 and $1,908,965, respectively. As listed in THE IRON AGE table, exports of power-driven metal-working machinery numbered 724 units valued at $1,235,109, against 696, valued at $998,344, in April.

Total imports of machinery and vehicles in May were valued at $2,424,688, a slight decrease under those for April, valued at $2,427,259. For May of last year the value was $3,389,320. For the five months ended with May the values were $11,401,985 in 1928 and $13,038,408 in 1927, showing a decrease of almost one-eighth for the five months of the current year. Imports of industrial, office and printing machinery in May were valued at $1,457,391, against $1,378,840 in April; and $6,684,804 for the five months ended with May of 1928, as compared with $7,688,333 for the corresponding period of last year. Imports of machinery listed in THE IRON AGE table were valued at $2,029,893 in May, against $1,935,751 in April, and $2,663,943 in May of last year. For the five months ended with May, 1928, and 1927, the values were $8,706,883 and $9,798,630, respectively.

Research and Market Study Needed in Steel

Future of Pittsburgh District Said to Depend on Laboratories, Sales Departments and Quality of Personnel

"THE future of steel in Pittsburgh depends on the ability of the industry to maintain the necessary research, and to put the results of that research into production effectively," declares Dr. Stephen L. Goodale, department of metallurgy, University of Pittsburgh, in the June issue of *Pittsburgh Record*, published by his college. "It depends also on a study of markets so that new conditions shall find our steel managements here prepared for them. Again, it depends upon maintenance of the high quality of the personnel engaged in steel production. If these conditions are met there need be no fear of a failure of sustained growth, and Pittsburgh will continue to be the greatest steel center of the country and probably of the world."

The recent growth of steel capacity in the West, he points out, represents the building up of a very young industry and naturally has been relatively rapid compared with that in Pittsburgh. The steel industry at Pittsburgh, he states, will doubtless grow at a satisfactory rate when compared with the growth in other districts in the future.

Pittsburgh Can Lead in Research

Pittsburgh has not lost any of its material advantages as a steel producing center, and it can expect to profit by the quality of its leadership and the momentum its industry has acquired during years of ascendancy, according to Doctor Goodale.

"There are three lines of effort along which study and planning will help—research, study of markets and living conditions," he said.

"Pittsburgh is well supplied with research institutions. For example, at the Mellon Institute of Industrial Research more than a hundred problems are under investigation at this time; and a number of these have a direct bearing on the steel industry. The personnel of a number of different departments in our local collegiate institutions is usually engaged for at least a part of its time in the study of problems in the steel industry.

"The United States Bureau of Mines, in its Pittsburgh experiment station, is conducting important fundamental research work on the open-hearth process of steel making and on other problems of the steel industry. The American Sheet & Tin Plate Co., the National Tube Co. and the Aluminum Corporation of America are notable examples of large corporations which maintain separate metallurgical research laboratories in this district, and the Westinghouse Electric & Mfg. Co. also has an important metallurgical department in its large research laboratory. There are always a large number of research problems under investigation at the various plants of the steel companies, mostly of an immediately practical nature.

"There is still room for extensive additional fundamental research in the steel industry, as this industry in general is considerably behind the chemical and electrical industries in promoting research and in securing the advantages to be derived therefrom.

"In electrical engineering, the General Electric and Westinghouse companies, and a number of other successful organizations, have large and well planned research departments. They have spent much on problems of fundamental information, in addition to the research directed to solving questions of immediately practical application and importance. All of these interests have profited largely by the results of such work themselves, and have advanced the uses of electricity in the service of mankind.

Market Changes Require Study

"From time to time new developments of various kinds bring about major changes in the relationships between different industries and considerable shifting of the centers of locations of industries. Some new product is developed and to a large extent replaces products previously in use. For instance, one may cite bakelite, a product of research in chemistry, and aluminum and the alloys of aluminum which serve excellently for many uses in place of iron or steel. To this extent aluminum is a competitor of steel. Other light and strong metals, such as magnesium and its alloys, are being actively developed.

"Steel producers need now more than ever before to study developments not only in steel but in other metals in order to plan ahead wisely to meet the competition that is forecast by such present developments.

Good Living Conditions Important

"If Pittsburghers wish to retain for this city its present steel supremacy one of the essentials required is that workers in steel shall find here good living conditions in terms of necessities and, in increasing measure, in terms of modern luxuries also. The large cities in our country are in direct competition for the best personnel in all walks of life.

"The whole community should join hands in a determined effort to keep Pittsburgh as good a city as can be in which to live. Economical and efficient administration of city and county affairs should be demanded, so that citizens shall receive the maximum in return for the heavy taxes which every great modern community demands of its people."

Steel Cartel Quota Unchanged—New President Elected

WASHINGTON, July 2.—The International Steel Cartel will maintain its present quarterly production schedule of 7,321,750 metric tons of steel ingots in the ensuing three months and will make no change in over-production penalties, according to a preliminary announcement covering the results of the meeting of the entente at Düsseldorf, Germany, June 25, relayed by cablegram to the Department of Commerce by its commercial attaché in Paris.

It also was reported that Aloyse Meyer was formally elected president of the cartel to fill the vacancy caused by the recent death of Emile Mayrisch, first president. M. Meyer is director-general of the Acieries Reunies de Burbach-Eich-Dudelange in Luxemburg.

European Markets Generally Dull

Continental Quotas Unchanged—German Export Prices Reduced—Wales Expects Benefit from Delimited Export Markets—Antwerp Strike a Disorganizing Factor

(*By Cable*)

LONDON, ENGLAND, July 2.

Pig iron is dull and the outlook is unfavorable. Dorman, Long & Co., damped one Newport blast furnace, reducing the number of Northeast Coast furnaces that are active to 34.

Only 27 Scottish stacks are now operating. Business generally is quiet and with the Glasgow Fair holiday approaching, little revival is anticipated before the end of August. Hematite iron is weaker on heavy stocks but prices are below cost.

Foreign ore is also quiet but Bilbao Rubio remains steady on the continuance of Swedish mines stoppage.

Finished iron and steel continue dull. Japan bought a few thousand tons of ship steel, and India placed some lines owing to the idleness of local Indian plant. But demand generally is poor and makers are operating part time only. Dorman, Long & Co. closed one Britannia steel furnace.

Continental iron and steel is quieter on the continued abstention of substantial buying, but market is likely to become disorganized if the strike of Antwerp dockers spreads as threatened.

The International Raw Steel Cartel made no alteration in quotas for the third quarter.

Belgian pig iron output for May was 360,000 tons and that of raw steel 329,000 tons. Fifty-six blast furnaces were active at the end of May.

French production for May was 871,000 tons of pig iron and 794,000 tons of raw steel. On May 31, there were 150 furnaces in blast.

Welsh tin plate bars are firm on continued demand and a shortage of steel scrap. Tin plates are quieter on the uncertainty of the tin market, but inquiry still is strong. Further important steps have been taken toward delimiting certain leading export markets, whereby Wales expects to receive substantial benefit and probably Welsh export prices will be raised.

There is an improved demand for galvanized sheets, especially from India and South Africa. Japan bought fair quantities of thick and thin gages of black sheets.

Germany Reduces Export Prices 25c to 50c a Ton

(*By Radio*)

BERLIN, GERMANY, July 2.

The international market is duller. Following the example of France and Belgium, Germany has reduced her export prices on rolling mill products by 1 to 2 shillings a ton.

The German home market is quieter. Demand steel has been reduced by increasing dullness in the engineering branches and by slowness in the revival of building.

June home prices of pig iron, semi-finished steel products and rolled products, including steel rails, are retained for July.

Production of both pig iron and steel is declining. Mills producing bars are best occupied and have delivery terms averaging 2½ months. The market for tubes and medium and thin sheets is weaker.

Average Age of German Equipment Is Low

HAMBURG, GERMANY, June 16.—New plants, equipments and general machinery acquired by the German steel industry in the years following the war have brought the average age of machinery and furnaces down to a point where they compare favorably with other European producing countries. At the end of April there were

British and Continental European prices per gross ton, except where otherwise stated, f.o.b. makers' works, with American equivalent figured at $4.87 per £ as follows:

Durham coke, del'd	£0	17½s.	to	£0	17¾s.	$4.27	to	$4.33
Bilbao Rubio ore*	1	2½				5.48		
Cleveland No. 1 fdy	3	8½				16.56		
Cleveland No. 3 fdy	3	6				16.07		
Cleveland No. 4 fdy	3	5				15.83		
Cleveland No. 4 forge	3	4½				15.71		
Cleveland basic (nom.)	3	5				15.83		
East Coast mixed	3	9	to	3	9½	16.81	to	16.93
East Coast hematite	3	10½				17.17		
Rails, 60 lb. and up	7	15	to	8	0	37.75	to	38.96
Billets	6	5	to	6	15	30.44	to	32.88
Ferromanganese	13	15				66.97		
Ferromanganese (export)	13	0	to	13	5	63.31	to	64.53
Sheet and tin plate bars, Welsh	6	0				29.22		
Tin plate, base box	0	18⅜	to	0	18⅝	4.47	to	4.53
Black sheets, Japanese specifications	13	7½				65.14		
						C. per Lb.		
Ship plates	7	12½	to	8	2½	1.66	to	1.77
Boiler plates	9	0	to	10	10	1.95	to	2.28
Tees	8	2½	to	8	12½	1.77	to	1.99
Channels	7	7½	to	7	17½	1.60	to	1.71
Beams	7	2½	to	7	12½	1.55	to	1.66
Round bars, ¾ to 3 in.	7	5	to	7	15	1.58	to	1.69
Steel hoops	9	0	to	10	0	1.95	to	2.17
Black sheets, 24 gage	9	15	to	10	0	2.12	to	2.17
Gal. sheets, 24 gage	13	10				2.93		
Cold rolled steel strip, 20 gage, nom.	14	0	to	14	5	3.04	to	3.10

*Ex-ship, Tees, nominal.

Continental Prices, All F.O.B. Channel Ports

(Per Metric Ton)

Foundry pig iron (a):								
Belgium	£3	3s.	to	£3	5s.	$15.34	to	$15.83
France	3	3	to	3	5	15.34	to	15.83
Luxemburg	3	3	to	3	5	15.34	to	15.83
Basic pig iron (nom.):								
Belgium	3	1	to	3	2	14.85	to	15.09
France	3	1	to	3	2	14.85	to	15.09
Luxemburg	3	1	to	3	2	14.85	to	15.09
Coke	0	18				4.39		
Billets:								
Belgium	4	15				23.14		
France	4	15				23.14		
						C. per Lb.		
Merchant bars:								
Belgium	5	13½	to	5	14	1.23	to	1.26
France	5	13½	to	5	14	1.23	to	1.26
Luxemburg	5	13½	to	5	14	1.23	to	1.26
Joists (beams):								
Belgium	4	17½	to	4	18	1.06	to	1.07
France	4	17½	to	4	18	1.06	to	1.07
Luxemburg	4	17½	to	4	18	1.06	to	1.07
Angles:								
Belgium	5	10	to	5	12½	1.21	to	1.23
⅛-in. plate:								
Belgium (a)	6	11				1.44		
Germany (a)	6	11				1.44		
⅜-in. ship plate:								
Belgium	6	7				1.40		
Luxemburg	6	7				1.40		
Sheets, heavy:								
Belgium	6	1				1.34		
Germany	6	1				1.34		

(a) Nominal.

109 furnaces in blast with an average age of 13 years. Steel furnaces show an average age of 16 years for the Thomas and only 9 years for the open-hearth furnaces.

General machinery and equipment in the steel industry have an average age of 14 years and machine tools of 8 years. The average age of equipment in other industries, however, is better than in the steel industry. Among the wire makers, nail machines only average 7 years and wire drawing machinery is only 6 years. The general averages for other countries are about 170 per cent higher in Great Britain, 30 per cent higher in Belgium and 80 per cent higher in France.

Steel Export Association Operating

Recent Tin Plate Purchase by Japan Distributed to Five Mills—Importers Protest Shape Duty

NEW YORK, July 2.—The newly formed Steel Export Association, which is understood to include most of the independent mills as well as the United States Steel Products Co., is apparently functioning. On about 62,000 base boxes of oil can tin plate for the Nippon Oil Co., bids of American mills are understood to have been substantially the same and the business was awarded to the leading Japanese export houses in New York for execution by an American mill or mills. The various bidders on this tonnage reported themselves not in a position to accept more than a small portion of the total, so that the award was finally made on a basis of equal distribution to four of the bidders, United States Steel Products Co., Bethlehem Steel Export Corporation, Weirton Steel Co. and Jones & Laughlin Steel Corporation, and 3000 tons to the Wheeling Steel Corporation, which was the maximum that company was willing to accept.

Among buyers for export the impression seems to be that large contracts will probably be handled in a manner similar to the method used with the Nippon Oil Co. tin plate order. On smaller tonnages, the impression prevails that a mill may accept half the order, which would necessitate the buyer placing the remainder with another maker, or will take the entire tonnage, but refrain from quoting on a similar inquiry for the same material that might develop shortly afterward.

Association May Gain New Markets

Foreign traders are inclined to discount the report that the Steel Export Association is a combination to maintain a higher level of prices in export sales. It is pointed out that while there has been severe competition among American sellers seeking export business, orders have seldom been taken at a price that was lower than necessary to meet the competition of Continental mills. At present the United States is not a dominant factor in the sale of iron or steel to any foreign market of importance, and traders seem to believe that the new association, by distributing business in a single market among the various mills which it includes, will be able to institute a real effort to establish itself in that market with a lower loss to the individual mill, as losses on such business will be better distributed.

With a market definitely secured for American mills, it is pointed out by foreign traders that producers here would be in a more tenable position than at present to suggest or receive the suggestion of an agreement with European mills bearing on the limitation of shipments of steel to the United States or to certain centers of consumption abroad.

Business with South America and Japan

Export business with South American markets is reported to be showing continued improvement, although orders are individually small. Japanese buying is light, but in addition to the award of tin plate by the Nippon Oil Co., the Kioto Oil Co. in Japan recently awarded about 3000 base boxes of a total inquiry for 12,000 boxes and is expected to return to the market soon for the remaining tonnage. Kioto municipality has awarded three miles of grooved and girder rails to a Japanese exporter and the order will be filled by an American mill. Tokio municipality has opened bids on nine miles of 91-lb. high T-rails and 100-lb. girder rails. A recent report from Japan states that the Kawasaki Dockyard Co. at Kobe, the leading black sheet producer of the country, will continue increasing its capacity for light gage black sheets and by 1929 expects to have a maximum production of 150,000 tons a year, compared with its present output of slightly less than 100,000 tons. The Government Works at Yawata is also planning a small increase in its black sheet output, so that it is estimated that with the Kawasaki mills turning out 150,000 tons of sheets annually the total for the entire country will be close to 200,000 tons.

Importers Protest Shape Duty

Importers of Continental steel in the United States, who are affected by the recent decision of the United States Treasury Department, which increases the duty on bar sized channels, angles and tees from 20c. per 100 lb., the structural rate, to 30c. per 100 lb., the duty on bars, have filed a brief with the Customs Court and action is expected this week. No decision on the reclassification of reinforcing bars under a paragraph calling for a lower duty is expected until some time this fall.

An active movement of foreign steel is reported at present as some sizable tonnages of material have been arriving in the past week, which were bought some time ago when the market was at a lower level. When this material has been disposed of, a period of dullness seems to be expected, as very little purchasing has been done by importers here since the recent rapid advances in Continental steel prices. Meanwhile, in the past week European quotations have been reduced, the third small reduction in about three weeks, and plain steel bars are now offered at 1.80c. to 1.85c. per lb., base, delivered New York, with structural shapes at 1.61c. to 1.71c. per lb., base. Small sales of hot rolled strip steel and hoops are reported and importers claim that deliveries from Continental mills are rather less extended than a fortnight ago, when two to three months was the usual time offered.

Decline in German Exports and Imports in May

Showing a loss of 10,266 metric tons, or 2.8 per cent, exports of iron and steel products from Germany in May totaled 353,815 metric tons, compared with 364,081 tons in April, according to radiograms received from Berlin by the Department of Commerce, Washington. Imports in May were the smallest of the current year, amounting to 166,020 tons, compared with 190,527 tons in April, a decline of 24,507 tons, or approximately 12.8 per cent.

Of the 21 classifications in the export list, 12 showed decreases and nine increases in May. Exports of semi-finished steel declined to 47,829 tons from 54,706 tons, while the greatest reduction was in plain wire, which decreased to 27,797 tons from 37,188 tons. The greatest gain was in iron and steel bars, rods and angles, which increased to 87,448 tons from 76,968 tons. Of the 21 classifications in the import list, 13 showed declines in May. The outstanding decreases were in iron and steel bars, which dropped 10,126 tons to 63,931 tons from 74,057 tons, and in rails, which declined 6799 tons to 5784 tons from 12,583 tons.

Production of pig iron in Germany in May was 1,044,056 tons, a reduction of 1412 tons from the April total. Steel production increased to 1,247,781 tons, a gain of 86,376 tons. At the end of May there were 104 furnaces in blast, a decrease of three from the April total.

The Edgar Allen Steel Co., Inc., manufacturer of high speed, carbon and alloy tool steels, has removed its New York office to 741 Washington Street and its Chicago office to 21 North May Street.

Machinery Markets and News of the Works

Machine Tool Demand Remains Steady

June Buying at Same Rate as in May and Sales for First Six Months Considerably Ahead of Same Period of 1927—Exports Gain in May

BUSINESS in machine tools in June ran at about the same rate as in May. An unusually good month was experienced in the Chicago district, due for the most part to the large volume of sales to agricultural implement makers.

Sales during the first six months of 1928 are estimated as approximately 20 per cent greater than in the same period in 1927. Companies specializing in high-production equipment participated generously in the business available, and another noteworthy feature is that demand has been from widely scattered sources in the general industrial field.

Steady trend of the machine tool orders in the first half of this year is also reflected from the monthly Index of Machine Tool Orders compiled by the National Machine Tool Builders' Association. The net orders of 63 reporting companies in the first month of 1928 were the highest of any month since May, 1920. February orders were also at a high level and the March index showed a continued upward trend, the level reaching that of the summer of 1919. In April the volume of orders was again fairly heavy, but in May it was somewhat less than April, but not enough to turn the trend line downward.

Recession during the summer months is no doubt to be expected, although in some quarters it is believed that business will continue at a fair rate.

Exports of machine tools during May increased approximately 24 per cent as compared with April. The figures are: 724 machines valued at $1,235,109 in May, as against 696 machines valued at $998,344 in April. Engine, turret and other lathes to the number of 164 account for 31 per cent of the total value of the May exports, and cylindrical, internal and tool grinders, numbering 252, for about 30 per cent.

Demand from the automobile industry has been comparatively light in the past 30 days, although some activity developed in the Michigan district during the week, with the purchase by the Pontiac Motor Car Co. of a fair sized lot of production machinery. The Wright Aeronautical Corporation, which has been making purchases for some time, is in the market for equipment that is expected to total close to $200,000.

New York

NEW YORK, JULY 2.—The two outstanding buyers of machine tools in this territory continue to be the Wright Aeronautical Corporation, Paterson, N. J., and the General Electric Co., Schenectady, N. Y. The Wright company, which has been quite a steady buyer for several months, is at present in the market for equipment that will probably total close to $200,000. The General Electric Co. has been buying against a list of 60 or more items for its refrigerating machinery plants, and last week asked for prices on an additional list of 15 presses. In the Buffalo district, the Curtiss Aeroplane & Motor Co. has been buying a few tools and is in the market for further equipment.

Among the railroads, the New York Central has a substantial number of inquiries upon which bids have been submitted, and recently inquired for a 21-in. lathe. The Brooklyn & Manhattan Transit Co. is inquiring for a small engine lathe and a saw. While there has been a slight decline in the volume of inquiries from small users during the past week, the heavy buying in prospect from large companies continues of substantial proportions.

Sales of tools in past week have been well distributed among different types of machines. Lathes continue an important item, and Pratt & Whitney Co. reports orders for a total of 12 engine lathes, of which five 13-in. were for one company, four 16-in. for a second company and three 20-in. for a third.

Department of Plant and Structures, Municipal Building, New York, has taken out a permit for a three-story housing station and destructor plant to cost $820,000, with power equipment, conveying, and other machinery; also for a two-story auxiliary building, 50 x 375 ft., ramp type, for conveying refuse, etc., to destructor station, to cost $130,000 with equipment.

Greenwich House, 29 Barrow Street, New York, operating a vocational training school, will soon begin superstructure for three-story metal-working and woodworking shop at 16 Jones Street, to cost in excess of $100,000 with equipment. Complete art metal-working tools and machinery will be installed. Delano & Aldrich, 126 East Thirty-eighth Street, are architects.

A. J. Thomas, 2 West Forty-sixth Street, New York, architect, will soon take bids on general contract for two-story automobile service, repair and garage building, 75 x 200 ft., to cost about $100,000 with equipment.

Common Council, Albany, N. Y., has approved additional appropriation of $100,000, making total fund of $460,000, for municipal airport development, including hangars, repair and conditioning shops, oil storage and distributing stations and other buildings.

Hudson Hardware Co., 236 Main Street, Yonkers, N. Y., has asked bids on general contract for one-story storage and distributing plant on Saw Mill River Road, to cost close to $50,000 with equipment. J. S. Bartley, 30 Fairview Avenue, is architect.

Jorgensen Brothers, Inc., 140 Lott Street, Brooklyn, operating an automobile repair works, has awarded general contract to Perri Contracting Co., 26 Court Street, for a one-story addition to cost about $40,000 with equipment. George J. Lobenstein, 885 Flatbush Avenue, is architect.

M. Silverstein, 26 Court Street, Brooklyn, architect, will soon begin erection of two-story automobile service, repair and garage building, 120 x 250 ft., to cost approximately $175,000 with equipment.

New York & Richmond Gas Co., 691 Bay Street, Stapleton, S. I., operating an artificial gas plant and system, is disposing of a preferred stock issue to total $1,500,000, a portion of proceeds to be used for expansion and improvements. William J. Welsh is president.

Koeppen Metal Products, Inc., 361 Manhattan Avenue, Union City, N. J., operating a chromium plating works, has acquired property at Carlstadt, N. J., for erection of two-story plant, 80 x 350 ft., to cost close to $70,000 with equipment. Present works will be removed to new location.

Mount & Robertson, Inc., 62 Broad Street, New York, cabinet manufacturer, has acquired plant at Boulevard and Ninth Street, West New York, N. J.,

heretofore used for textile manufacture, and will remodel for new factory.

P. D. Kinney, Newark, has taken out permit for a one-story machine repair shop at 59-61 Lock Street, to cost about $25,000 with equipment.

American Can Co., 120 Broadway, New York, has plans for extensions and improvements in seven-story plant at Jersey City, to cost about $40,000. A. B. Heiser is company architect.

Public Service Electric & Gas Co., Public Service Terminal, Newark, is arranging for sale of preferred stock issue to total about $28,000,000, a portion of proceeds to be used for extensions and improvements in power plants, power switching stations, transmission lines, etc.

Frederic P. Humphreys, head of Frederic P. Humphreys, Inc., 347 Madison Avenue, New York, naval architect and yacht builder, and associates have organized Humphreys Shipyard Corporation to build Diesel engine-driven yachts and similar seacraft. New company has acquired property of Monmouth Marine Railways, Keyport, N. J., for establishment of plant.

Steelcraft Coverator Co., Inc., 641 Lexington Avenue, Brooklyn, has been formed to make radiator cabinets and shields and kindred metal specialties. Plant at above address is equipped and in operation, but company is in market for steel furniture sheets, 12 to 24 gage, steel tubing, angle iron and metal grilles.

Gravity Separator & Equipment Co., 15 East Twenty-sixth Street, New York, has been organized to manufacture gravity separators and special equipment for separating water from oil, grease, tar or other fluids of varying specific gravity. Manufacturing is being done by contract and awards have been made.

New England

BOSTON, JULY 2.—Comparatively few machine tools were sold the past week. Dealers were active, however, following up prospects which give promise of closing this month. It is reported that the Boston & Albany Railroad has bought some of the tools included in its list of about 25 machines, including radial drills and milling machines. The third list of tools for the Boston Hyde Park district school includes the following:

Two 14-in. x 6-ft. tool room lathes.	One 15-in. shaper.
One 13 x 30-in. geared-head lathe.	One 2½-in. radial drill.
One 1¼ x 8-in. turret lathe.	One 24-in. turret lathe.
One 20-in. shaper.	One heavy-duty geared-head engine lathe.
One 16-in. crank shaper.	Two 15-in. x 6-ft. engine lathes.

It is understood the city will purchase these machines, as well as others contained in two previous lists, some time this month. A manufacturer of electrical goods is in the market for a radial drill. Several textile mills have signified their intention of replacing machine shop tools within the next few months. This is the first time in more than a year the mills have evinced any interest in metal-working equipment. A New England machine tool builder is expected shortly to be in the market for some equipment.

Small tools are moving in good volume once more. The most active houses say there has not been a month this year when sales have not run ahead of those last year.

Hunt Spiller Mfg. Corporation, 383 Dorchester Avenue, Boston, has started work on a one-story, 40 x 70 ft. addition. Plans are private.

The city of Brookline, Mass., has awarded contract for alterations to its manual training school. Maurice P. Meade, 80 Boylston Street, Boston, is architect.

Albert Kahn, Inc., 100 Marquette Building, Detroit, is taking bids for a three-story, 117 x 234 ft., service plant addition for Packard Motor Car Co., Commonwealth Avenue and Melvin Street, Boston.

Nashoba Cold Storage Co., Ayer, Mass., has awarded contract for a cold storage plant. Motors and conveying equipment will be used. Haynes & Mason, 280 Main Street, Fitchburg, Mass., are architects.

York Ice Machinery Corporation, 200 Causeway Street, Boston, engineer, is preparing plans for a $100,000 ice making plant for Ice Utilities, Inc., Fall River, Mass.

American Radiator Co., 120 Federal Street, Boston, has asked bids on general contract for one-story addition to plant at Somerville, 76 x 168 ft., to cost close to $60,000 with equipment. William A. Dykeman, 10 Devonshire Street, is architect. Headquarters are at 40 West Fortieth Street, New York.

James Purdon, 50 Congress Street, Boston, architect, has revised plans for two-story automobile service, repair and garage building, 100 x 150 ft., to cost approximately $110,000 with equipment.

In connection with expansion and improvement program, American Writing Paper Co., Holyoke, Mass., has approved plans for three-story beater room addition, 40 x 52 ft., and steam power house, 45 x 56 ft., to cost more than $65,000 with equipment. Entire program will approximate $500,000.

Plans are under way for establishment of municipal airport at Southington, Conn., including hangars, repair and recondition shops, oil storage and distributing building, etc. Site has been acquired in Plantsville section. Southington Exchange Club, Dewey S. Blakeslee, president, is in charge.

Public Service Co. of New Hampshire, Manchester, plans early construction of transmission line from recently acquired power plant at Bristol to Ossippee and Conway, N. H., about 35 miles, including switching station, substation, etc., to cost about $100,000.

Henry G. Thompson & Son Co., New Haven, Conn., manufacturer of metal cutting saws and saw machines, has made arrangement with Bay State Saw & Tool Co., Winchester, Mass., by which it will manufacture Bay State line of hack saws. Bay State plant will be removed to New Haven and E. T. Bailey will continue as president.

Fafnir Bearing Co., New Britain, Conn., has let contract to Aberthaw Co., Boston, for erection of manufacturing building in addition to two other structures now under construction. It will be six stories, 60 x 290 ft.

W. Scott Thomas, 303 National Exchange Bank Building, Providence, R. I., has been appointed New England representative for Axmann Sand-Throwing Machine Co., Cleveland, manufacturer of sand-throwers and kindred equipment.

St. Louis

ST. LOUIS, July 2.—Arrangements have been made by Stifel, Nicolaus & Co., St. Louis, for purchase of Moloney Electric Co., with local plant at Kingshighway and Union Avenue, manufacturer of electric transformers, in which controlling interest heretofore has been held by American Brown Boveri Electric Corporation, 420 Lexington Avenue, New York. New owner has arranged for bond issue of $1,500,000 a portion of proceeds to be used for expansion.

Universal Automobile Service Co., 633 North Grand Boulevard, St. Louis, has plans under way for six-story service, repair and garage building, to cost in excess of $400,000 with equipment. Pleitsch & Price, Arcade Building, are architects.

Gruendler Patent Crusher & Pulverizer Co., 320 North Fourth Street, St. Louis, has purchased property at Glasgow and North Market Streets, and plans early construction of one-story machine shop, approximating 21,000 sq. ft. of floor space, to cost about $50,000 with equipment.

Missouri Power & Light Co., Jefferson City, Mo., is disposing of bond issue of $1,500,000, a portion of proceeds to be used for expansion in power plants and system.

Capital Garage, Inc., 1025 Wyandotte Street, Kansas City, Mo., will proceed with superstructure for a seven-story and basement service, repair and garage building, 125 x 130 ft., to cost in excess of $200,000 with equipment. C. A. Smith, Finance Building, is architect.

Brandon Stove Co., East Markham Street, Little Rock, Ark., has filed plans for rebuilding portion of four-story plant, recently destroyed by fire, with loss reported at more than $40,000 including equipment.

The International-Great Northern division of Missouri Pacific Railway is in market for a 90-in. heavy-duty driving wheel lathe for turning locomotive tires.

H. C. Peterson, Bankers' Reserve Life Building, Omaha, Neb., architect, will soon take bids for two-story automobile service, repair and garage building, to cost $110,000 with equipment.

Following recent acquisition of Davis Boring Tool Co., Spring and Forest Park Avenues, St. Louis, Larkin Packer Co., 6200 Maple Avenue, manufacturer of oil well equipment and supplies, has begun erection of one-story addition, to be used largely for machine shop in connection with removal of acquired interest to that location, to cost about $25,000.

Mapes Consolidated Mfg. Co., Tenth and Locust Streets, Kansas City, Mo., has authorized construction by day labor of one-story and basement machine shop, 56 x 80 ft., to cost about $21,000 with equipment. John C. Lawrence, Commercial Building, is architect.

Plant and general offices of Scullin Steel Co., St. Louis, are at 6700 Manchester Avenue. Sales department only is located in Security Building, Fourth and Locust Streets.

East St. Louis Casting Co., Sixteenth Street and Kansas Avenue, East St. Louis, Ill., has plans for one-story foundry for furnace castings, to cost more than $30,000 with equipment.

Pittsburgh

PITTSBURGH, JULY 2.—For some machine tool dealers, June bulked fairly heavy in point of sales, but for most of them it was a rather lean month. Standard machines and tools did little, and it was special machinery that contributed largely to order books of some dealers whose business averaged well with earlier months of the year. Crane business is light, but there are few steel companies in this and nearby districts that are not figuring on improvements and asking for prices for estimating purposes.

Contract has been let by Pittsburgh Safety Glass Co., Frick Building, Pittsburgh, subsidiary of Pittsburgh Plate Glass Co., same address, to Mellon, Stuart & Co., Oliver Building, for new plant at Creighton, Pa., to cost approximately $800,000 with machinery.

Board of Education, Ambridge, Pa., is considering installation of manual training equipment in addition to junior high school, to cost about $180,000 with equipment. Bids will soon be asked on general contract by W. Ward Williams, 309 Fourth Avenue, Pittsburgh, architect.

Bids will be received by United States Engineer office, Huntington, W. Va., until July 10 for 11,900 lb. buttonhead rivets; 218 steel buckle plates; 700 bolts and 32,053 lb. plates, circular 216

United States Corrugated Fiber Box Co., Seventeenth Street, Wheeling, W. Va., is said to be completing plans for an addition to cost in excess of $85,000 with equipment.

Pittsburgh Parking Garage, Inc., 555 Sixth Avenue, Pittsburgh, has awarded general contract to Mellon, Stuart & Co., Oliver Building, for seven-story service, repair and garage building, 60 x 200 ft., to cost more than $200,000 with equipment.

Philadelphia

PHILADELPHIA, July 2.—Property at 1202-10 Filbert Street, Philadelphia, has been purchased by Nevin Bus Terminal Co., Philadelphia, as site for multi-story service, repair and terminal garage, to cost in excess of $180,000 with equipment.

Board of Education, Nineteenth and Ludlow Streets, Philadelphia, contemplates installation of manual training equipment in new four-story senior high school in Olney section, to cost close to $500,000, for which plans will be drawn by Irwin T. Catharine, address noted, architect.

Thomas W. Swanger, 4607 Fern Hill Road, Philadelphia, and associates nave organized Swanger Brothers Co., to operate local plant for manufacture of tools and machine specialties. William E. Swanger, Hackettstown, N. J., is also interested in new company.

Pennsylvania Salt Mfg. Co., Widener Building, Philadelphia, has authorized immediate construction of plant on 43-acre tract, recently acquired at Tacoma, Wash., to be operated by its subsidiary, Tacoma Electrochemical Co. Three buildings will comprise initial unit, totaling close to 30,000 sq. ft. of floor space, to cost more than $200,000 with equipment. Entire project will cost approximately $1,000,000.

Christian Gunther, Jr., 1618 Germantown Avenue, Philadelphia, and associates have organized Titgen-Eastwood Co., with capital of $50,000, and contemplate early operation of plant for production of foundry equipment and supplies.

Department of Institutions and Agencies, Trenton, N. J., is completing plans for one-story industrial building at Colony for Feeble Minded, Vineland, N. J., to cost about $100,000 with equipment. C. N. Leatham, State Office Building, is architect.

Tidewater Fertilizer Co., New Castle, Del., has acquired local industrial property and will remodel for new plant unit, with installation of electrically-operated machinery, conveying equipment and auxiliary apparatus.

Bethlehem City Ice Co., Bethlehem, Pa., care of Butz & Clader, 523 Hamilton Street, Allentown, Pa., architects, is having plans prepared for one-story ice-manufacturing plant, to cost close to $70,000 with equipment.

Haverford Township School Board, Brookline, Pa., plans installation of manual training equipment in two-story addition to junior high school to cost $200,000, for which plans are being completed by Boyd, Abel & Gubert, Otis Building, Philadelphia, architects.

Detroit

DETROIT, July 2.—Plans are under way by Automatic Products Co., 1145 West Grand Boulevard, Detroit, manufacturer of screw machine products, for one-story addition, 120 x 450 ft., to cost in excess of $150,000 with equipment. Smith, Hinchman & Grylls, Marquette Building, are architects.

Belle Isle Creamery Co., 3600 East Forest Avenue, Detroit, has filed plans for two-story automobile service, repair and garage building for company trucks and cars to cost about $90,000 with equipment. Williams & Cougian, Kresge Building, are architects.

Flint Super-Speedway Airport, Inc., Flint, Mich., has secured permission to sell stock in amount of $798,000, fund to be used for establishment of airport, to include hangars, repair and mechanical shops, oil storage and distributing buildings, and other units.

Verner, Wilhelm & Molby, Book Building, Detroit, architects, have plans under way for naval airport at Grosse Isle, Mich., consisting of metal hangars, machine and repair shops, administration building, oil storage and distributing building and other units.

Oakland Motor Car Co., Pontiac, Mich., has authorized plans for group of foundry buildings, comprising six one-story structures, totaling 200,000 sq. ft. of floor space, to cost more than $500,000, with equipment. Company is also planning for installation of new chassis parts plant unit.

International Harvester Co., 606 South Michigan Avenue, Chicago, truck division, is said to be completing plans for one-story factory branch, service and repair building at Detroit, to cost close to $100,000 with equipment.

V. J. Waier & Co., 2539 Woodward Avenue, Detroit, architects, have plans for three-story automobile service, repair and garage building to cost upward of $100,000 with equipment.

Grand Haven Stamping Works, Inc., Grand Haven, Mich., has completed arrangements for one-story addition, to cost more than $25,000 with equipment.

Firestone Tire & Rubber Co., Akron, Ohio, has acquired property at Grand Rapids, Mich., and plans early erection of new factory branch and distributing plant, to cost about $180,000 with equipment.

Marquette County Commissioners, Ishpeming, Mich., have plans for a new automobile service, repair and garage building for County motor trucks and cars, to cost about $85,000 with equipment.

Contract for new General Motors engineering laboratory has been awarded to the Everett Winters Co., Detroit. It will be 12 stories, 210 x 231 ft., and will cost approximately $2,500,000.

Great Lakes Chemical Works, Idaho Avenue at Detroit Terminal Railroad, Detoit, whose plant was destroyed by fire June 12, has moved into new quarters at West Jefferson Avenue and Junction Street and has installed equipment for production of Babbitt metal, solder, type metal and metal oxides, practically doubling former capacity.

Buffalo

BUFFALO, July 2.—Contract has been let by Carborundum Co., Buffalo Avenue, Niagara Falls, N. Y., to Laur & Mack, 1400 College Street, for a five-story addition, to cost in excess of $85,000, with equipment. L. J. Call is company engineer.

American Cyanamid Co., Niagara Falls, Ont., with headquarters at 535 Fifth Avenue, New York, is arranging for increase in capital stock from 320,000 to 500,000 shares, to total about $3,297,000, a considerable portion of fund to be used for extensions and improvements in plants at Niagara Falls and Warners, N. J., and for new plant on site lately secured at Linden, N. J.

George J. and Albert P. Ahles, 623 Roosevelt Avenue, Rome, N. Y., have organized Fort Stanwix Mfg. Co., capitalized at $36,000, and plan early operation of plan for manufacture of tools, dies, jigs and kindred products.

E. B. Green & Sons, and Albert H. Hopkins, 1 Niagara Sq., Buffalo, architects, have plans for six-story automobile service, repair and garage building, to cost in excess of $500,000 with equipment, to be owned and operated by Genesee Motoramp Garage, Inc., 93 Pearl Street.

Curtiss Aeroplane & Motor Co., Inc., Kail Street. Buffalo, is arranging for increase in capital from 300,000 to 600,000 shares of stock, no par value, a considerable portion of proceeds to be used for expansion and improvements, including construction of new plant units. A reconstruction program, arranged by previous financing is now under way, to cost approximately $250,000.

D. H. P. Mfg. Co., Inc., Johnstown, N. Y., has been organized by Henry and Mitchell Denkert, 308 South Melcher Street, with capital of $50,000, and contemplates early operation of plant for manufacture of water strainers, filters and kindred products.

Plans are being considered by Sealright Co., Inc., Fulton, N. Y., manufacturer of special sealed cardboard containers, etc., for a two-story addition to cost more than $200,000 with machinery.

The Crane Market

INQUIRY for overhead traveling cranes has declined somewhat in the past week or 10 days, but there is some good business still to be placed. Among recent inquiries is a request for prices on two 5-ton electric cranes from the Fairbanks Co., New York, for its plant at Binghamton, N. Y. The United States Hoffman Machinery Corporation, New York, is in the market for two small cranes and some monorail with hoists for its plant at Syracuse, N. Y. Inquiry for locomotive cranes is less active than a few weeks ago. Action seems to be expected soon on the list of cranes and steam shovels being inquired for by Dwight P. Robinson & Co. for export to South America.

In the Chicago district the Appleton Machine Co., Appleton, Wis., is about to buy two 10-ton electric traveling cranes, and the Public Service Co. of Northern Illinois is in the market for a 15-ton and 35-ton electric traveling crane.

Among recent purchases are:

Montan Treating Co., Boston, a 15-ton, 8-wheel locomotive crane, reported purchased from American Hoist & Derrick Co.

Griffin Wheel Co., Chicago, three 1-ton wheel pitting cranes, through Page Sales Service, Chicago, from Milwaukee Electric Crane & Mfg. Co.

American Rolling Mill Co., Butler, Pa., a 25-ton overhead crane from Morgan Engineering Co.

Kitts Steam Specialty Co., Inc., Oswego, N. Y., manufacturer of valves, traps and steam specialties, has moved from 56 East Second Street to its new plant at West Second and Erie Streets.

Oswego Falls Corporation, Fulton, N. Y., has awarded contract to Austin Co. for two-story factory, 100 x 113 ft., at its Sealright branch, for manufacture of paper containers.

Gulf States

BIRMINGHAM, July 2.—Plans are being arranged by Texas Co., Texas Co. Building, Houston, Tex., for construction of pipe line from West Texas to Houston, about 470 miles, to cost close to $10,000,000 with booster stations, etc. It is purposed to extend line shortly following from Houston to Port Arthur, Tex., about 90 miles, where main refinery of company is located.

Rome Electric Range Co., Rome, Ga., recently reorganized with capital of $1,500,000, is planning removal of plant to Huntsville, Ala., where facilities will be provided for increased capacity.

Traders' Oil Mill Co., Fort Worth, Tex., plans one-story addition to cottonseed oil mill to cost $25,000 with equipment.

Claiborne Parish School Board, Haynesville, La., is considering installation of manual training equipment in two-story and basement high school to cost $200,000, for which bids have been asked on general contract. Edward F. Neild, City Bank Building, Shreveport, La., is architect.

Clyde Steamship Co., Pier 36, North River, New York, is said to be planning new cold storage and refrigerating plant at its pier at Miami, Fla., to cost about $55,000 with equipment.

Texas Wire & Nail Mfg. Co., Galveston, Tex., is completing work on new plant and plans early operation; galvanized wire department will also be placed in service within few weeks. Plant will have capacity of about 2000 kegs of nails, 50 tons of galvanized wire, and about 100 tons barbed wire per day. Company has authorized installation of department for keg manufacture. Charles Jackson is plant superintendent.

S. S. Dutton Co., Sanford, Fla., is planning to rebuild its ice and precooling plant recently destroyed by fire, with loss in excess of $100,000 including machinery.

Central Power & Light Co., San Antonio, Tex., plans extensions and improvements in La Palma power plant, vicinity of San Benito, Tex., including installation of 10,000-kw. turbo-generating unit and accessory equipment. Additions will also be made in transmission lines.

Board of Education, Port Arthur, Tex., plans installation of manual training equipment in new two-story Thomas Jefferson High School, to cost $400,000, for which bids will soon be asked on general contract. M. Lemmon, Construction Industries Building, Dallas, Tex., is architect.

James B. Clow & Sons, Inc., North Talman Avenue and West Lake Street, Chicago, manufacturer of plumbing equipment and supplies, pipe, etc., has acquired a controlling interest in National Cast Iron Pipe Co., Birmingham, and contemplates expansion in facilities for increased production.

Pecos Valley Refining Co., Pyote, Tex., has approved immediate addition to gasoline refinery to cost more than $125,000 with equipment.

Refining Castings Corporation, Dallas, Tex., has been formed to operate gray iron foundry, specializing in refinery castings. Contracts for building and equipment have been let:

Chicago

CHICAGO, JULY 2.—June closed as an unusually good month in the machine tool trade. The character of business, however, was quite different from a year ago at this time. In the first six months of 1928 only one major railroad list has been submitted to dealers in this district. In the absence of railroad business there has been a large volume of orders from agricultural implement manufacturers, a fair amount of which has been for replacement and plant betterment, and a large number of machine tools have been purchased for plant extensions, especially in tractor works. For several months there has been a good run of miscellaneous orders from scattered sources. Fresh inquiry from the railroads includes a 36-in. shaper for the Rock Island and a 36-in. boring mill for the Chicago, Burlington & Quincy. Used tools are in fair demand.

Contract has been let by Mills Novelty Co., 4110 Fullerton Avenue, Chicago, manufacturer of vending machines and parts, to Thomson & Son, 30 North La Salle Street, for a four-story addition, to cost $175,000 with equipment. F. Rogers, 14 West Washington Street, is architect.

Board of Education, Decatur, Ill., plans installation of manual training equipment in new three-story junior high school, to cost $300,000, for which bids will soon be asked on general contract. Brooks, Bramhall & Dague, National Bank Building, are architects.

R. B. Kurzon, 105 West Monroe Street, Chicago, architect, will soon take bids on general contract for three-story automobile service, repair and garage building, to cost about $425,000 with equipment.

C. S. Card Iron Works Co., Denver, Colo., has plans for one-story addition to machine shop, 40 x 240 ft., to cost about $23,000 including equipment.

Lubbers & Bell Co., North Second Street, Clinton, Iowa, manufacturer of hardware products, will proceed with work by day labor on one-story addition, 85 x 160 ft., to cost close to $40,000 with equipment. A. N. Morrell, Clinton, is architect.

Halsam Products Co., 1801 Warren Avenue, Chicago, manufacturer of toys, etc., is completing new three-story plant, 35 x 125 ft., to replace a structure destroyed by fire several months ago.

Peoples Gas Light & Coke Co., 122 South Michigan Avenue, Chicago, has awarded general contract to Ford & Phillips, 559 West Van Buren Street, for one-story meter building and laboratory, with repair and parts departments, testing division, etc., to cost in excess of $50,000 with equipment.

William Robertson & Son, Chicago, manufacturers of high pressure lubricators, have moved their office and factory to 1424 North Halsted Street.

O. C. Keckley Co., Chicago, has acquired control of Lowerie Mfg. Co., Springfield, Ill., manufacturer of hydraulic presses.

Indiana

INDIANAPOLIS, July 2.—Contract has been let by Warner Gear Co., Muncie, manufacturer of automobile transmissions, to Albert J. Glaser, 610 South Jefferson Street, for a two-story addition, to cost about $80,000 with equipment; also contract to Austin Co., Cleveland, for one-story machine shop, 150 x 250 ft., to cost approximately $50,000 with equipment. R. P. Johnson is president.

DuBois-Robineau Furniture Co., Du Bois, has awarded general contract to Van Hoy Construction Co., Loogootee, Ind., for rebuilding two-story factory recently destroyed by fire, to cost $100,000 with equipment.

Certainteed Products Co., Anderson, manufacturer of roofing products, etc., will make extensions and improvements in plant to cost in excess of $50,000 with equipment.

Board of Sanitary Commissioners, City Hall, Indianapolis, O. C. Ross, president, will receive bids until July 17 for centrifugal pumping machinery and auxiliary equipment for extensions in sewage disposal plant in Eagle Woods district. Charles H. Hurd, Merchants' Bank Building, is engineer.

Evansville Ice & Storage Co., 10 North Eighth Street, Evansville, has asked bids on general contract for two-story cold storage and refrigerating plant, to cost about $65,000 with equipment. G. E. Wells, Inc., 100 West Monroe Street, Chicago, is engineer.

Truck Engineering Co., East Pontiac Street, Fort Wayne, has engaged Guy Mahurin, Standard Building, architect, to prepare plans for two one-story units at motor truck equipment plant, to cost more than $35,000 with equipment. Roy Spaulding is general manager.

Stanworth Tool Mfg. Co., manufacturer of counterbores, countersinks, end mills, reamers, etc., formerly at Indianapolis, is now operating in its new plant at Lebanon. Manufacturing space has been tripled, new equipment has been installed, and production has been considerably increased.

Taylor Brothers Mfg. Co., Elkhart, has been organized to manufacture grease guns, non-corrosive terminals and cables, cantilever tool boxes and measuring devices. Products will be manufactured by company or under contract, principally at plant of Indiana Aluminum Ware Corporation. C. E. Taylor is president of company.

Cincinnati

CINCINNATI, JULY 2.—Machine tool buying was sustained at a moderate rate the past week, with the result that sales in June closely approximated those in May. Three or four leading builders report that bookings last month were from 10 to 15 per cent better than in the previous month. On the other hand, a number of manufacturers noted a downward trend in orders. The tone of the market is healthy, and most executives are optimistic about the outlook for business during the summer. While a recession is expected, it is not likely that it will assume grave proportions. Several companies are of the opinion that purchases will continue at the present rate through July and August.

Sales in the first six months of 1928 were from 15 to 20 per cent ahead of those in the same period of 1927. It is worthy of note that those companies which have specialized in building high production tools are the ones which have made the best records during the first half of the year. Automobile makers have accounted for only a small percentage of the machinery sold in the last 30 days, most of the business having been placed by companies in the general industrial field.

Bids will be received by State Department of Public Welfare, Columbus, for new power plant and equipment at local Institution for Feeble Minded, as per plans and specifications at office of Herbert B. Briggs, Ohio-Hartman Building, State architect. Same department has plans under way for power plant and equipment, water supply and tunnel system at State institution at Apple Creek, to cost more than $200,000, for which bids will be asked in August. J. E. Harper is director.

Constructing Quartermaster, Wright Field, Dayton, Ohio, will receive bids until July 20 for expansion joints.

Procter & Gamble Co., Gwynne Building, Cincinnati, has filed plans for addition to plant at St. Bernard, Ohio, comprising pumping plant, tank and tower building, and lime recovery unit, to cost about $45,000.

United States Stove Corporation, South Pittsburg, Tenn., recently organized under Delaware laws, has acquired local plant and business of Wetter Mfg. Co., manufacturer of stoves, heating equipment, etc. New owner is disposing of bond issue for $175,000, portion of proceeds to be used for extensions and improvements.

Atlantic Ice & Coal Co., 106 Collins Street, S.E., Atlanta, Ga., has plans for ice-manufacturing plant at Knoxville, Tenn., with initial output of 125 tons per day; a cold storage unit will also be built, entire project to cost in excess of $150,000 with equipment. Engineering department is in charge.

Board of Education, Louisville, plans installation of manual training equipment in new three-story high school to cost $235,000, for which plans have been filed. S. D. Jones is business director.

Cleveland

CLEVELAND, JULY 2.—Increased activity developed in the machine tool market in the Michigan territory the past week. The Pontiac Motor Car Co. purchased a fair sized lot of production machinery, and some other good business is pending from another automobile manufacturer. The market continues rather quiet in the Cleveland territory. There is some demand from manufacturers of automobile parts and tire molds, but orders are confined mostly to single tools. The Columbia Chemical Co., Barberton, Ohio, came into the market for a number of machines, but is understood to have purchased used tools from a Chicago dealer. Turret lathes continue to move well in single orders. Machinery business in June, on the whole, will show about the same volume as during May.

Plans are being drawn by the Federal Foundry Supply Co., 2639 East Seventy-ninth Street, Cleveland, for new one-story plant, 90 x 255 ft., to cost about $130,000 with equipment. E. A. Weiland & Co., 2725 Pittsburgh Avenue, are architects.

Radio Electric Co., Scienceville, Ohio, manufacturer of lighting equipment, nickel-plated desk lamps, etc., has approved plans for one-story plant, 60 x 165 ft., to cost about $50,000 with equipment.

Ohio Power Co., Canton, Ohio, will issue bonds in amount of $6,333,000, and preferred stock for $2,111,400, a portion of proceeds to be used for extensions and improvements.

Board of Trustees, Marsh Foundation School, Van Wert, Ohio, Dr. R. R. Reeder, director, is having plans drawn for new industrial arts building, to cost more than $90,000 with equipment. Langdon, Hohly & Gram, Security Building, Toledo, Ohio, are architects.

Thompson Products Co., 2196 Clarkwood Road, Cleveland, manufacturer of bolts, nuts, etc., has awarded general contract to deHamel Construction Co., Plymouth Building, for one and two-story addition, 53 x 122 ft., to cost about $55,000 with equipment.

White-Chevrolet Co., Zanesville, Ohio, local representative for Chevrolet automobile, is completing plans for three-story and basement service, repair and garage building, totaling about 45,000 sq. ft. floor space, to cost close to $95,000 with equipment. W. S. Jameson, 31 North Fifth Street, is architect.

Cleveland Electric Illuminating Co., Illuminating Building, Cleveland, has acquired municipal light and power plant at Ashtabula, Ohio, and plans expansion and betterments, including construction of transmission lines for connection with present system, as well as other lines for power supply in Ashtabula dock district.

Steubenville Pressed Steel Co., Steubenville, Ohio, has been formed to manufacture and fabricate pressed steel products. Temporary quarters have been leased and company has begun manufacture of garage hardware.

Pacific Coast

SAN FRANCISCO, June 27.—H. W. Hull, 851 Monadnock Building, San Francisco, and associates have made application for permission to construct and operate a hydroelectric power plant on Independence Creek in Klamath National Forest, to cost in excess of $200,000.

Diamond Hardwood Flooring Co., Los Angeles, plans rebuilding portion of mill destroyed by fire June 19, with loss more than $80,000 including equipment.

Chaffey Union High School District, Ontario, Cal., is planning new vocational school unit in connection with high school group, to cost in excess of $300,000. Allison & Allison, Hibernian Building, Los Angeles, are architects.

Board of Public Works, San Francisco, has granted appropriation of $50,000 for addition to municipal car barns, for repair and garage service for motor buses used on system. M. M. O'Shaughnessy is city engineer.

Watsonville Ice & Cold Storage Co., Watsonville, Cal., is arranging an expansion and improvement program to cost $250,000, including installation of equipment. Initial work will consist of extensions and betterments in power house to cost about $75,000.

Union Pacific Railroad Co., Portland, has taken out permit for a one-story forge and blacksmith shop at its repair yards, to cost close to $30,000 with equipment. Plans have also been completed for one-story flue shop.

Culmock Furniture Co., Oakland, Cal., will rebuild portion of factory recently destroyed by fire, with loss estimated at $65,000 including equipment.

Riverside Cement Co., Riverside, Cal., operating mills at Crestmore, near Riverside and at Oro Grande, Cal., is disposing of a preferred stock issue to total $6,500,000, a portion of proceeds to be used for extensions and improvements. John Treanor is president.

Port of Seattle Commission, Seattle, has plans for a municipal grain elevator with capacity of 1,000,000 bu., to cost $900,000, with elevating, conveying, screening and other machinery. Engineering department is in charge.

Jenison Machinery Co., 50 Fremont Street, San Francisco, has been formed to acquire good will and stocks of San Francisco office of Smith Booth Usher Co., operating in northern California as distributer of machine tools, woodworking machinery, construction equipment, pumps, engines, motors and other products.

Hardie Mfg. Co., maker of spray and power pumps, has purchased site at Fifteenth and Northrup Streets, Portland, Ore., and will erect two-story brick and concrete building.

South Atlantic States

BALTIMORE, July 2.—Plans are being completed by International Harvester Co., Truck Division, 606 South Michigan Avenue, Chicago, for one-story factory branch, service and repair building at Baltimore, to cost close to $115,000 with equipment. Bids will be asked on general contract.

Tidewater Oil Co., 11 Broadway, New York, with main refinery at Bayonne, N. J., has acquired tract of five acres, vicinity of Pennington Avenue and Baltimore & Ohio Railroad, Baltimore, for new storage and distributing plant, to cost more than $350,000 with machinery.

United Railways Co., Continental Building, Baltimore, is having plans completed for one-story and basement motor bus service, repair and garage building, 195 x 400 ft., to cost in excess of $150,000 with equipment. W. H. Emory, Jr., 18 East Lexington Street, is architect and engineer.

Lexington & Thomasville Gas Co., Thomasville, N. C., is considering construction of new central artificial gas plant, to cost more than $150,000 with equipment.

Bids will be received by Chemical Warfare Service, Edgewood Arsenal, Md., until July 13 for one steam heated tray dryer with fan; one sifting machine; one grinding mill and auxiliary equipment, circular 120; until July 13 for one oxygen bomb-testing apparatus; one laboratory outfit, and one 12-in. recording hygrometer, circular 119.

Public Improvement Commission, Munsey Building, Baltimore, has plans for a two-story storage and distributing plant for municipal service, to cost about $375,000 with conveying, elevating and other equipment. J. E. Greiner, Lexington Building, is engineer.

McGowan-Motes Motor Co., 521 Broad Street, Augusta, Ga., will soon begin erection of one-story service, repair and garage building, 130 x 145 ft., to cost about 100,000 with equipment. Willis Irvin, S. F. C. Building, is architect.

District Commissioners, District Building, Washington, contemplate installation of manual training department in new E. A. Paul Junior High School, Brightwood district, to cost $500,000, for which bids will soon be asked on general contract. A. L. Harris, District Building, is architect.

City Council, Shelby, N. C., has approved plans for extensions and improvements in municipal electric light and power plant, including installation of additional equipment.

Henry I. Grines, Asheville, N. C., architect, has filed plans for three-story automobile service, repair and garage building, 145 x 200 ft., to cost upward of $100,000 with equipment.

American Chatillon Corporation, 393 Seventh Avenue, New York, has awarded general contract to McClintic-Marshall Co., Oliver Building, Pittsburgh, for rayon mill at Rome, Ga., to include power house, machine shop and other mechanical units, to cost in excess of $3,500,000. Lockwood, Greene & Co., 1 Pershing Square, New York, are architects and engineers.

Canada

TORONTO, JULY 2.—Machine tool sales have fallen off the past week, but from recently announced programs of some industrial companies for plant extensions, prospects for an early resumption of buying are good. The automotive industry continues to buy for replacement and the General Motors of Canada, Oshawa, is having lists prepared for equipment for a new plant in western Canada and another in Ontario. A brisk demand is reported for small tools from mining fields of Ontario.

Construction has been started on a newsprint mill at Liverpool, N. S., for Royal Securities Corporation, Montreal. Work has also been started on a 20,000-hp. hydroelectric plant by Nova Scotia Power Commission to supply power for mill. Foundation Co. of Canada, Ltd., Montreal, has general contract for both mill and power plant.

Weaver Canadian Co., Ltd., Chatham, Ont., manufacturer of automobile jacks and pumps, garage equipment, etc., is having plans prepared for a new plant, 36 x 190 ft.

Bids are being received by B. A. Jones, architect, 14 Ontario Street South, Kitchener, Ont., for one-story addition, 50 x 125 ft., to plant of Galt Art Metal Co., 385 Dundas Street, Galt, Ont.

American Can Co., 2065 Jeanne d'Arc Street, Montreal, will build a five-story addition to its factory, 130 x 200 ft. Company engineers have plans.

W. H. Wardwell, 1463 Union Avenue, Montreal, is preparing plans for a 10-story warehouse for Manufacturers Terminal Co., 1835 Ontario Street East, Montreal.

Bids will be called soon for a new plant on Coxwell Avenue for Service Station Equipment Co., Ltd., 510 King Street East, Toronto, manufacturer of gasoline pumps. It will be one story, 122 x 340 ft., steel and brick construction.

Ralston, Purina Co., Ltd., Main Street, Woodstock, Ont., has awarded contract to Harding Construction Co., Buffalo, for a five-story addition, 80 x 80 ft., to cost $60,000.

Steel Equipment Co., Pembroke, Ont., is planning an addition to its factory to cost approximately $70,000; work to be undertaken this summer. D. P. Cruikshank is vice-president.

Imperial Oil Co., King and Church Streets, Toronto, has purchased site on Ninth Avenue for establishment of a garage, office, warehouse, boiler house, barrel washing plant, light products pump house, etc., to cost approximately $300,000.

Western Canada

Langley Electric Mfg. Co., Ltd., 677 Notre Dame Avenue, Winnipeg, is receiving bids, no closing date set, for a one-story addition, 66 x 100 ft.

Dominion Carton & Envelope Co., Edmonton, Alta., has let contract to L. F. Toby, 433 Tegler Building, for a one-story factory, 100 x 184 ft., to cost $35,000. Architect is R. P. Blakey, 417 Empire Block.

Claydon Co., Ltd., 708 Confederation Life Building, Winnipeg, has been awarded contract for an addition, 305 x 317 ft., to Weston freight car shops at Winnipeg for Canadian Pacific Railway.

Milwaukee

MILWAUKEE, JULY 2.—Waukesha Motor Co., Waukesha, Wis., manufacturer of gasoline engines for motor trucks, tractors, industrial and contractors' equipment, is embarking on a plant extension program requiring an investment of $600,000 in buildings and machinery. Details are now being considered. It is planned to begin work by end of July and have additional manufacturing facilities available by Jan. 1. Harry L. Horning is president and chief engineer.

Heil Co., 1131 Montana Avenue, Milwaukee, Wis., manufacturer of steel dump bodies, hydraulic hoists and tank equipment, etc., has placed general contract with Klug & Smith, consulting engineers, 69 East Wisconsin Avenue, local, for erection of a one-story addition, 74 x 302 ft. Inquiry is being made for miscellaneous equipment, including punches, shears, drills, shapers, lathes, etc. Hydro-Hoist Co., a subsidiary, recently was consolidated with Heil Co., and present enlargement is for benefit of both operations. Julius P. Heil is president, treasurer and general manager.

Modine Mfg. Co., 1700 Racine Street, Racine, Wis., manufacturer of automobile, truck and industrial radiators and coolings systems, will place contracts about Aug. 1 for additions costing approximately $100,000.

Board of Education, Antigo, Wis., is taking bids until July 7 for a two-story addition, 52 x 74 ft., to Antigo Vocational Training School, to be used largely for metal and wood-working processes. Designer is Donald M. Schopeke, 125 Wausau Road, Antigo.

Hochenauer-Stresau, Inc., Milwaukee, has been organized to manufacture machinery, mechanical appliances and devices. Principals include Carl J. Hochenauer, 1510 Maryland Avenue, who has been a sales manager of A. O. Smith Corporations; R. S. Stresau and Leo Mann. Definite plans will be made public later.

Belle City Mfg. Co., Racine, Wis., manufacturer of individual threshing outfits, crawler attachments for tractors, etc., has taken over production and marketing of line of corn harvesting and husking machines heretofore made by Continental Mfg. Co., Springfield, Ohio. No important additions to plant or equipment will be made at this time, however.